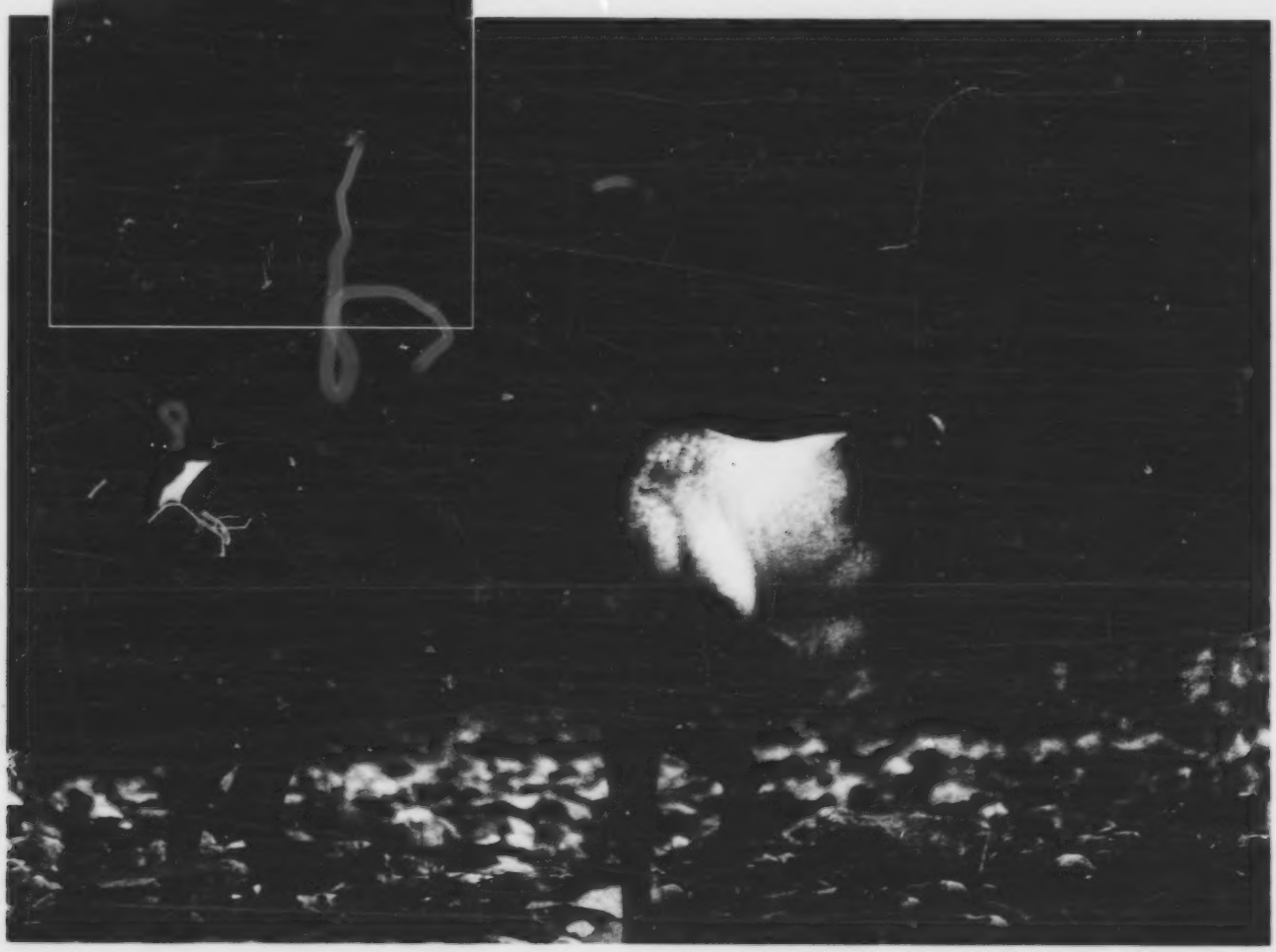
PEOPLE & CARIBOU

IN THE NORTHWEST TERRITORIES



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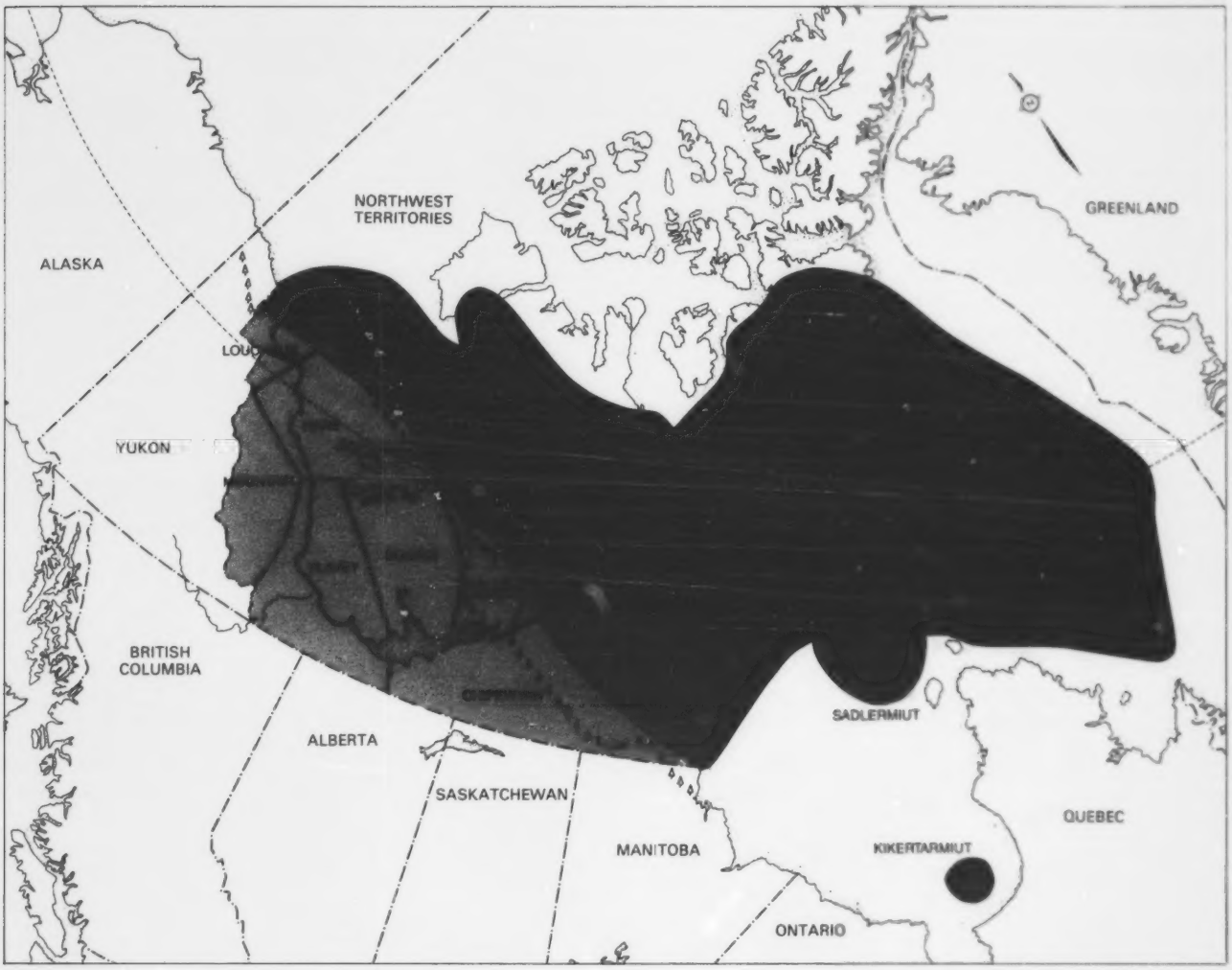

INUIT AND DENE TRIBES
IN THE NORTHWEST TERRITORIES

PEOPLE & CARIBOU

IN THE NORTHWEST TERRITORIES

ED HALL, EDITOR

Department of
Renewable Resources

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"Caribou-Man Drummer" carving on title page by David Ruben Piqtoukun
Materials: soapstone, caribou antler, caribou fur, ivory, pipestone
Photographer: Tessa Macintosh
Collection: Sam and Esther Sarick

"In the old days, hunters had to be very wise and cunning in order to acquire their basic staple and feed their families well. This carving depicts a caribou-man transformation, drumming in a ceremony to become one and the same as a caribou. In order to track the caribou, he has to be like one. This is the sign of a great hunter." (David Ruben Piqtoukun)

CONTENTS

FOREWORD 7

ACKNOWLEDGEMENTS 9

PEOPLE

1. TRADITIONAL USE (Chuck Arnold) 11
2. PRESENT USE (Ed Hall and Elisabeth Hadlari) 25
3. CLOTHING (Jill Oakes) 37
4. NUTRITION (Jill Christensen) 43
5. STORIES AND LEGENDS 51

SCIENCE

6. BIOLOGY (Doug Urquhart) 67
7. HABITAT (Doug Heard and Paul Gray) 75
8. RESEARCH (Doug Heard) 81
9. MANAGEMENT (Ed Hall and Kevin Lloyd) 89

BARREN-GROUND CARIBOU

10. HISTORY OF RESEARCH (Doug Urquhart) 95
11. BLUENOSE HERD (Paul Latour) 103
12. BATHURST HERD (Doug Heard) 109
13. BEVERLY HERD (Anne Gunn) 117
14. KAMINURIAK HERD (Cormack Gates) 123
15. NORTHEASTERN MAINLAND (Mark Williams) 131
16. NORTHERN HUDSON BAY (Bob Decker) 135
17. BAFFIN ISLAND (Mike Ferguson) 141

OTHER CARIBOU

18. PORCUPINE HERD (Doug Urquhart) 151
19. WOODLAND CARIBOU (Paul Gray and Paul Panegyuk) 159
20. PEARY CARIBOU (Anne Gunn) 165
21. REINDEER (Jonquil Graves) 171

NOTES ON CONTRIBUTORS 178

GLOSSARY OF CARIBOU NAMES 180

FURTHER READING 183

FOREWORD

Caribou are the one species of wildlife that are used by residents throughout the Northwest Territories. This book represents many years of effort collecting a vast amount of information from the knowledgeable public and professionals in several fields of science. It is the most comprehensive text produced about caribou in the Northwest Territories.

I hope you will all be enlightened about caribou by this book and gain an appreciation of the close link they hold with the people in the Northwest Territories. Caribou are an important part of the legacy of the North and in essence are the "life blood" of the people. My Department of Renewable Resources supports the management and wise use of caribou to ensure that future generations may also enjoy this resource.

The Honourable Titus Allooloo
Minister of Renewable Resources

Acknowledgements

This book took years to produce and is the result of much hard work by many people. The contributors are all dedicated professionals who made a determined effort to get things right. Their patience and perseverance have made this a better book.

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The carving by David Ruben Piqtoukun appears courtesy of its owners, Sam and Esther Sarick. "The Boy Who Found the Lost Tribe of Caribou" by Donald Kaglik is used with the kind permission of the Committee for the Original Peoples' Entitlement. The quotation on page 79 is reproduced from George Calef's *Caribou and the Barrenlands* (1981) and is used with the kind permission of the Canadian Arctic Resources Committee.

Finally a special word of thanks goes to Shirley Ambrose who typed the entire manuscript and then, without a single murmur of complaint, incorporated a steady stream of changes, updates, and corrections over the years. Her contribution to the book was a major one.

Dene hunting at a brush corral.

TRADITIONAL USE

BY CHUCK ARNOLD

The land before me here, it alone
Abounds with food
Abounds with reindeer moss
On the land before me here
You will want to set your footprints
My reindeer moss you will want to
come to!

These magic words used to lure caribou were revealed to the explorer-anthropologist Knud Rasmussen in 1923 by Nakasuk, an Inuk of the Netsilik (Seal) tribe. The verse conveys reverence, even in translation. For the Netsilik Inuit, as indeed for most of the native peoples of the Northwest Territories (NWT), life before the arrival of the Europeans was closely tied to the caribou.

The major environmental divisions of the NWT have long been occupied by two very different cultures. The coniferous forest of the subarctic is the traditional homeland of the northern Athapaskans, the Dene. To their north, in the tundra plains and along the seasonally frozen coasts of the arctic, are the Inuit. Although these vast regions with their long and bitterly cold winters might appear austere and inhospitable to outsiders, the Dene and Inuit possess knowledge and skills which have permitted them to flourish for thousands of years.

Prior to feeling the influence of white society, the Dene and Inuit lived almost exclusively by hunting and fishing, and for those who dwelled within the range of the caribou it became the focus of many of their activities. The meat, blood, and stomach contents of the caribou provided them with a balanced diet. Antler, bone, and sinew were fashioned into tools, weapons, and ornaments; and caribou pelts were used for tents, bedding, and warm clothing. The nomadic movements of many of the tribes were harmonized to the seasonal cycle of the caribou, and caribou were important figures in Inuit and Dene religion

and mythology. In effect, the lives of people of the north merged with those of the caribou and the other animals which sustained them.

THE DENE

Archaeologists working in northern Canada have traced dependency on caribou far into the past. The first inhabitants of what is now the NWT entered the southern fringes of the region between 7,000 and 8,000 years ago, before the glaciers of the Ice Age had fully disappeared and before the forests had become established. Their origins remain a mystery. It is clear, however, that those ancient pioneers came following the caribou. The archaeological sites of the earliest time periods usually are found at locations where migrating caribou can be intercepted. The bones of game animals are seldom preserved for more than a few centuries, but artifacts excavated from those sites include spear points for killing large animals, knives for butchering carcasses, and scraping tools for working hides.

With time came changes. The coniferous forest became established in what was formerly a tundra zone, and the need to adapt to changing conditions brought about developments in culture. Despite these changes, dependence on caribou persisted over broad areas within the subarctic. This is particularly evident along the northern fringe of the forest from the lower Coppermine River drainage east to the Hudson Bay, where archaeological sites of the Taltheilei culture, which came into existence about 2,500 years ago, are found. This distribution of archaeological sites corresponds to the territory occupied in historic times by the branch of the Dene known as the Chipewyans, and the Taltheilei people quite likely were their direct ancestors. Indeed, it is possible that the cultural roots of the Chipewyan and other northern Athapaskan Indians extend back to the period of first human occupation in the NWT, making theirs one of the longest-lasting hunting traditions in all of North America.

The Chipewyan (including a closely related group, the Yellowknife) Indians were the most numerous and widely distributed of the Dene at the time Europeans first entered the NWT. In addition to occupying the broad arc along the northern edge of the forest, the Chipewyans extended into northern Manitoba and Saskatchewan and, more recently, into Alberta. Several divisions of the Chipewyan can be recognized. Members of one of these groups, the Ethen-eldeli or "Caribou eaters," lived within the forest edge west of Hudson Bay. They were so-named because the game animal upon which they depended most was the barren-ground caribou. The Ethen-eldeli also fished and hunted other game, but those resources were of secondary importance. As more information is available on the traditional culture of the Ethen-eldeli than for any of the other caribou-dependent Dene, they are the focus of the following discussion.

The ebb and flow of the migratory barren-ground caribou had a strong influence on the Ethen-eldeli. Caribou gather in large numbers during the spring migration from the winter range to the calving ground and in mid-summer. At other times they are usually scattered in small groups. This behaviour of the caribou dictated the movements of the Ethen-eldeli, and also the manner in which the caribou were hunted. These aspects of their culture can best be described in terms of a cycle of movements and activities which was repeated year after year.

In winter, most barren-ground caribou inhabit the fringe of the forest. They were hunted individually and in small groups for part of that time. Several techniques were used, one of the most common being for a hunter on snowshoes to chase caribou through deep snow. The hunter had the advantage, and could usually tire a caribou to the point where he could approach within bow and arrow range. Another individual hunting

Dene hunter stalking caribou

strategy involved setting snares of babiche — strips of tough, untanned skin — at antler level along game trails. The snares would be attached to sturdy trees, if available; otherwise they were tied to poles which would get tangled in brush when pulled along by the ensnared animal.

Although these kinds of hunting strategies were important for survival, by and large they were employed while awaiting opportunities for a community hunt involving a large number of people who built and employed a corral-like enclosure known as an impoundment. Traces of impoundments may still be seen throughout the subarctic, and a few elders remember the days when they were used. Perhaps the best source of written information regarding the impoundment is the journal of Samuel Hearne, a Hudson's Bay Company employee who travelled through the northern forests and tundra with Chipewyan guides between the years 1770 and 1772.

Hearne noted that impoundments were constructed in clearings or on frozen lakes or rivers. The corral

portion of the impoundment was built of brush, and ranged upwards to one-and-a-half kilometres around, and sometimes even larger. Inside were shorter brush fences, which were set up to resemble a maze, with babiche snares in the openings. A narrow entrance was flanked on either side by a row of brush opening into a wide "V." The wings of some impoundments extended outwards for several kilometres. This type of construction took considerable energy to build and maintain, and was most economically done by a large number of people working together. The hunt itself was also a community affair. When caribou were spotted, almost everyone in the camp positioned themselves to drive the caribou first into the gathering lane and then into the corral. While the women and children circled the fence, shouting to prevent the caribou from breaking through, the men speared the animals which had become entangled in snares and shot those still loose using bow and arrows. In March of 1771, Hearne visited an impoundment camp which had been used since the beginning of winter, which shows just how good a hunting method this was.

With the lengthening days of spring the caribou entered the next phase of their cycle and moved north onto the tundra. The Ethen-eldeli followed them on the first part of this journey, although they seldom moved far beyond the trees. Because of the lack of brush on the tundra, impoundments could not be built for communal hunts. Instead, sticks topped with strips of hide which fluttered in the wind were placed in converging rows leading to low, stone-walled blinds. Again the women and children took part, routing the caribou to hunters concealed behind the blinds. Some solitary hunting strategies were used on the summer ranges as well. These often involved tricking the caribou. A hunter draped with caribou skins and holding antlers above his head could approach within arrow range, and during the rut caribou bulls were lured by rattling pieces of antler together. Upon hearing that sound, the bulls apparently think that a female is being fought over and go to investigate.

The most important of the summer caribou hunts took place toward the end of the season, when the caribou came together in large numbers and moved towards the winter ranges in the forest. Communal hunting was once again practised, this time when caribou swam rivers and lakes which lay across their migration routes. Hunters with canoes would lie in wait on the bank where they reckoned that the caribou would come on shore. When the herd was part of the way across they would launch their canoes, encircling the animals and spearing them.

Virtually all edible parts of the caribou were consumed. Even the bones were used, breaking them into small pieces which were boiled to release their grease. Meat eaten immediately following a kill usually was boiled or roasted. In winter, surpluses of meat could be kept frozen for later consumption. In summer the meat was cut into strips, which were dried and then smoked in a teepee-like structure. Some of the dried meat was pounded between two stones to turn it into powder, mixed with caribou back fat and berries, and stored in skin bags. This "pemmican" had a lower volume than an equivalent amount of dried meat and was more easily transported as the Ethen-eldeli moved across the landscape, playing out the seasonal pursuits of their annual cycle.

Besides being the single most important source of food to the Ethen-eldeli, caribou were vital for their hides. These were used for a wide variety of purposes, including thongs, containers, tent coverings, sleeping robes, and clothing. It has been estimated that for clothing alone each individual needed as many as twenty skins a year. A minimum of two suits was required. The robe, shirt, leggings, breechcloth, cap, mittens, and moccasins worn in winter were made from hides obtained in late fall, when they were in prime condition.

Traditional Dene uses of caribou.

antler arrow point
bone knife
bone hide scraper
bone awl
moccasins
bone needle
sinew thread
babiche
hoof rattles
tents,
clothing,
food

By that time, the holes of the warble fly larvae which perforate the skin earlier in the season have healed, and the animals have grown thick coats of hollow hair which provide excellent insulation, but which, unlike winter skins, are not too thick for clothing or susceptible to shedding. Hides used for winter clothing had the hair left on, and were simply scraped on the inside to remove the fat and inner membrane, and softened by creasing and rolling. Hides for summer clothing were tanned, which required more preparation. The steps involved in tanning a hide include scraping both sides (often using tools made from the leg bones of the caribou) to remove the hair and soft tissues, soaking in an oily substance such as caribou brains, and smoking. The tailored garments were sewn with threads of caribou sinew using needles made from caribou bone.

In addition to dominating the economic pursuits and strongly influencing the material culture of the Ethen-eldeli, caribou had a major effect on the less tangible aspects of their society. This included the manner in which people related to each other. The main social unit was the "local band," which consisted of closely related families. It had to be flexible, since there was variation not only in the size of the camp throughout the year, but also in its composition, as individual families from time to time would move into different hunting grounds. For most, these irregular shifts in locale usually took place within the confines of a broader hunting range occupied by the regional band with which they were affiliated. The people comprising the regional band were usually related by blood or through marriage, although the ties were not as strong as within the local band.

The hunting grounds of the various regional bands coincided closely with the winter foraging ranges and migration routes of the barren-ground caribou herds. The eastern Ethen-eldeli hunted the Kaminuriak herd, the western regional bands relied upon the Beverly herd, and the Yellowknives were associated with the Bathurst herd. Within these ranges, families would hunt alone or would come together with others of their local or even regional band, depending upon the distribution of the caribou at the time. There was less interaction between members of different regional bands, as they hunted different caribou herds, or at least different segments of the same herd. As a result, some cultural and linguistic differences arose between the regional bands. This is not meant to imply that the various regional bands were isolated from one another. They were not, since social isolation could result in starvation for people depending on caribou, whose habits are erratic. For that reason, marriages and other alliances between members of different regional bands often were encouraged to facilitate movements between hunting ranges.

As might be expected, caribou are central figures in the traditional belief structure of the Ethen-eldeli. A pervasive element of traditional Dene religion is animism, the concept that animals have souls which live on after death. Care must be taken not to offend the spirits of caribou which are killed, as they could then become dangerous. Rules to prevent this from happening are expressed as prohibitions, or "taboos," such as the strictures that caribou meat and fish are to be kept apart, and that dogs must never gnaw caribou heads. It is an important tradition, too, to show respect to the first caribou of the season caught in a snare by hanging its tongue and fat from a tree. Legends give further insights to the relationship between the Ethen-eldeli and the caribou. Some of the most revealing are those in which the people identify with the wolf — who, like the Ethen-eldeli, hunt the caribou to survive. The subject of other legends is Bedzi-aze, the "little caribou calf," who is the son of a woman and a caribou bull. Bedzi-aze is said to be the ruler of all the herds, and it is believed that as long as men continue to talk about him there will be caribou.

Other Dene in the NWT also relied on barren-ground caribou, although few did so to the same degree as the Ethen-eldeli. For the most part, the Dene of the aboriginal period were opportunists, hunting what was available. Most similar to the Ethen-eldeli, both in terms of dependence upon caribou and specific hunting strategies, were the Dogribs. Some bands of the Hare also moved out onto the tundra in summer to hunt caribou. Loucheux (also known as Kutchin) in the far northwest hunted both the barren-ground and the less gregarious woodland caribou. Caribou also were important to the Mountain Indians, but in their territory the barren-ground caribou was completely replaced by the woodland subspecies. The distribution of the Slavey also corresponded to that of the woodland caribou, but they are known to have travelled east of the Mackenzie River to hunt on those occasions when the barren-ground caribou came close. These differences in resource base resulted in some differences in the material and social culture of the various Dene groups, but the essential fabric of life described here was common to them all.

THE INUIT

The first people to become established along the frozen coasts of arctic Canada came from the west, from the Siberian and Alaskan shores bordering Bering Strait where Inuit cultures underwent their early stages of development. Their migrations eastward into the far northern latitudes of Canada began about 4,000 years ago. The Inuit of today, however, trace their ancestry to a later wave of people who moved from the west approximately 1,000 years ago. These people are know as the Thule (pronounced "too-lee").

One of the most spectacular aspects of the Thule pioneers was their reliance on large bowhead whales, which they hunted from fragile skin-covered boats. The Thule expanded from Alaska at a time when the northern climate was somewhat milder than today. This decreased the duration and extent of sea ice, permitting bowhead whales to expand their range into the now ice-choked straits which separate the islands of the high arctic, far north of the mainland. It is along the coasts of those high arctic islands that the earliest Thule occupations in the central Canadian arctic are found, consisting of the remains of small clusters of houses made of rock, sod, and whalebone. These winter dwellings typically have deep middens which are rich in broken, lost, and discarded tools and the bones of the animals which they hunted to supplement whales. Caribou bones, when found, are not usually very numerous -- perhaps because the early Thule had moved into the range of the Peary caribou, whose small scattered groups were harder to hunt than the seals, walrus, and whales which abounded in the sea.

Dramatic changes are noted in the archaeological record of the Thule culture a few generations after they settled in the far north, when the warming trend which encouraged their territorial expansion came to an end. We can speculate that sea ice became more prevalent, curtailing the distribution of whales in the central regions of the Canadian arctic and forcing the Thule to seek new hunting territories and to develop new adaptive patterns in order to survive. Most of the high arctic was abandoned, and the population shifted south. In many areas there was also a shift from settlement on shore in winter to residence in snow-house camps on the sea ice where seals were harpooned. And, instead of hunting sea mammals in the open water in summer, many now trekked to the interior to fish and to hunt caribou, for their southward retreat had brought them to the summer feeding grounds of the migratory barren-ground caribou. These were the same animals which were hunted elsewhere on their migration routes by the Ethen-eldeli and other aboriginal Dene.

It was in this manner that the

culture of the Netsilik Inuit, one of the several groups of central arctic Inuit, developed. Like the Dene, they were nomadic wanderers, but instead of travelling between forest and tundra the Netsilik moved between tundra and frozen ocean.

The trek inland began soon after the sea ice had rotted to the point that it no longer was safe to venture out on it in pursuit of seals. Caribou begin to appear north of the treeline by mid-April — cows with calves first, and later the bulls. However, they were not actively pursued until later in the season. During the first part of summer the meat of caribou is lean and their hides are poor, and in addition the animals are shy and difficult to approach. For most of the summer the Netsilik subsisted on fish. Lake trout were taken through holes in the frozen lakes, and later the upstream run of char was fished at stone weirs built across streams.

Caribou were not completely neglected during this period, and were hunted when the opportunity presented itself. Usually, these were individualistic endeavours, or involved only a few hunters at most. The primary hunting implement at this time was the bow and arrow. The Netsilik had only rare access to wood, so their bow was a composite affair made of antler and muskox horn spliced together. Since these materials were not by themselves elastic, braided strings of sinew were attached along the front of the bow to give it the required elasticity. The sinew and the reflex shape of the bow made it an effective weapon, lethal at ranges even beyond 20 metres. In some situations it was possible to stalk caribou and so get within bow range, but this was not always necessary as certain tricks could be used to attract the animals. One such strategy involved two hunters, walking one behind the other imitating the movements of caribou, who with luck would follow after the men. Once the caribou were lured, one of the men would hide and await an opportunity to shoot while the other continued to lead the animals. Caribou bulls also were attracted during the rut by hunters holding antlers above their heads and imitating the grunting sounds of the animals. Bulls are on the look-out for cows at that time, and would come to investigate.

Like their neighbours to the south, the Netsilik hunted caribou most intensively in autumn when the animals amassed in large herds and began the migration south to the winter feeding grounds. Their numbers and purposeful movements rendered them vulnerable at precisely the time that they were fat and with prime pelts. The preferred technique was to hunt the migrating caribou from kayaks, spearing the animals while they swam across rivers. The kayak is a portable form of water transportation, consisting of a light wooden frame covered with sealskins. It is fast and maneuverable, and could easily bring the hunter alongside the swimming caribou. In fact, almost the only time the Netsilik employed their kayaks was during the caribou hunts.

At some of the hunting spots, rows of boulders piled several high were built at intervals along a route which converged on a river or lake. These *inukshuit* (singular, *inukshuk*) are taken by the caribou to be men, or at least something to be avoided. Women and children acted as beaters when the caribou appeared, chasing them towards the inukshuit and thence toward the river where the hunters waited with their kayaks. The beaters also made sounds to imitate wolves, triggering a defensive reaction in the caribou to enter the water, at which point the hunt began.

Along some rivers are areas where the terrain forms a natural caribou crossing. These crossings usually occur where rivers enter and exit large bodies of water along the caribou migration routes, or are adjacent to islands which break up the breadth of a river that the caribou must swim. Many of these locations are regarded as holy places, as neither inukshuit nor beaters normally are required to direct the caribou.

Inuit hunting at a caribou crossing.

An Inuit archer.

In early winter, following the large-scale hunts, the Netsilik switched to individualistic or small-scale hunting of the stragglers who had not joined the migrations. Some of the neighbouring groups of Inuit are known to have used pitfalls dug into snowbanks with upturned knives planted at the bottom. The pits were then covered over with sticks and snow, and baited with urine which attracts caribou because of its salt content. A particularly dangerous technique involved chasing caribou out onto the thin ice of newly-frozen lakes, causing them to break through. The hunters attempted to spear the animals from the edge of the ice, but this technique is known to have taken a high toll from the hunters as well.

The Netsilik required caribou for many of the same reasons as noted for the Ethen-eldeli. Caribou meat was important, and usually was eaten raw. The stomach contents were a delicacy, and one of the few sources of vegetation in the diet. Vital too were the hides, which were used for tents, sleeping robes, winter clothing (waterproof sealskin was preferred for sum-

mer garments), containers, and on occasion even for sled runners. Sleds with runners of skin were built in winter, as freezing temperatures were essential for their construction. A hole was first chopped through ice covering a lake or river, and the hides were dipped into the water below. When they were thoroughly soaked the hides were removed and spread out. A row of frozen fish was laid along one side of each skin, which was then rolled up. Any additional shaping was done quickly, and the skins were left to freeze solid. Antler cross-pieces were lashed to the top of two runners that were formed in this manner, and a layer of mud or moss was frozen to the bottom of the runners to prevent the skins from wearing.

The typical winter clothing of the Inuit consisted of fur coat, trousers, leggings, and boots, each with two layers. The outer layer of clothing was made using caribou skins that were air-dried and scraped on the inside only, leaving the hair on, facing out. The inner garments also had the hair left on, facing in, but these had to be softened. If temperatures were below freezing, the skins were first used as bed robes so that body heat would soften them, making them easier to scrape and stretch. This process had to be repeated several times before they were ready to be sewn.

Due to the habits of the caribou and the other game which they pursued, the Netsilik maintained a nomadic existence which required variability in the size and composition of their camps. Like the Ethen-eldeli, households of a local band came together at various times of the year for communal activities, including the caribou hunt at the crossing places. Also like their neighbours to the south, they devised ways to promote cohesiveness between the members of the camps and also with people elsewhere who might have to be relied upon in times of need. Blood and marriage ties were important, but so too were "partnerships" which were commonly established between unrelated or only distantly related individuals. Unrelated hunters could camp and hunt together at a caribou crossing and would share their game on the basis of these partnerships. A hunter would also share the caribou which he had killed with his relatives in the camp. So well-defined were the rules about sharing that the hunter who procured an animal often would be left with the smallest share. This did, however, put emphasis on cooperation during the hunt by ensuring that all would benefit from the success of any one individual.

The traditional belief system of the Inuit included the concept that animals have souls, and those of caribou in particular were considered to be quick to take offense. Therefore, the animals had to be treated in strict accordance with a system of taboos if continued hunting success were to be ensured. Furthermore, the souls of caribou could become dangerous if any of the taboos connected with them were violated. Women were forbidden to skin and butcher caribou. It was essential not to mix the resources of the sea with those of the land; for instance, seal and caribou meat could not be eaten on the same day. This prohibition was extended to cooking caribou meat over a driftwood fire, since driftwood was considered by the Netsilik to be a product of the sea. Caribou skin clothing was not to be made until the autumn hunt was over, but on the other hand, caribou skins could not be worked during the dark months of winter. These and other prohibitions might seem to be overly restrictive to an outsider, but for the Netsilik they lent security in an unpredictable environment by precisely defining the behaviour of man with respect to the animals which he relied upon. Specific adaptive values were attached to some of the taboos as well, as in the case of the prohibitions against cooking caribou, which would destroy the vitamin C in raw meat.

The Netsilik attempted to increase their chances of success during the hunt by the use of magical devices known as amulets. The front teeth of caribou, sewn to the breast of the in-

bone hide scraper
antler arrow point
antler harpoon head
bone fish hook
antler comb
sinew thread
tooth amulets
kamiks
mitts
clothing,
bedrobes,
food

ner coat, gave good luck to the hunters, and wolf hair was worn by beaters to make them effective in scaring caribou toward the hunters. Magical words also were used, such as those uttered by Nakasuk which introduce this chapter.

Not all Inuit had the same degree of reliance upon caribou as did the Netsilik. Their neighbours along the mainland coast and in the low arctic islands exhibited similar patterns, but farther north, where the barren-ground caribou were replaced by the less numerous Peary subspecies, caribou usually were not as important. On the other hand, the Caribou Inuit of the central Keewatin exhibited a year-round dependence on caribou, to the point of spending the winters in the barrens hunting those animals which did not migrate south below the treeline. Regardless of the degree of their dependence, life would have been very difficult for the majority of the Inuit without the caribou.

CARIBOU AND NATIVE PEOPLE TODAY

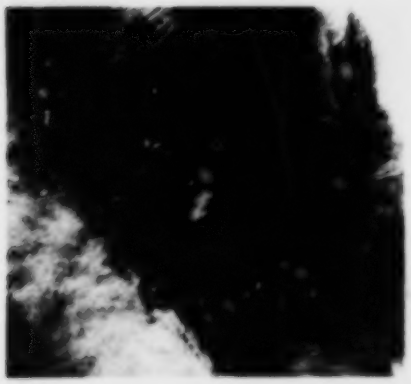
The nomadic way of life is a thing of the past for the Inuit and Dene. The Netsilik now live mainly in the settlements of Gjoa Haven, Pelly Bay, and Spence Bay, while the Ethen-eldeli who reside in the NWT have their homes in places like Fort Smith, Fort Resolution, and Snowdrift. Across northern Canada, schools, jobs, and other aspects of modern life have concentrated the population and drastically altered lifestyles. Still, caribou remain very important.

A majority of the native people hunt and fish, although metal boats with outboard motors and rifles with telescopic sights have replaced the bows and arrows, canoes, kayaks, and spears of earlier days. In those communities which are close to the caribou ranges, hunters can now commute to the herds using snowmobiles. Some families in settlements which are more distant maintain outpost camps and bush camps as hunting bases, and in other cases hunters band together and charter aircraft to take them to the caribou.

It is often difficult to adjust the reality of community life to the preference for living off the land. Increasingly, however, progressive northern employers recognize the importance of hunting and provide their workers with time-off for that activity. For many northern people, caribou are an important source of "country food" which is cheaper to obtain, more nutritious, and better-tasting than store-bought meat. Although caribou skins no longer are essential for tents, bedding, and clothing, craft industries have developed which rely upon hides and antlers. Most important, however, is the fact that caribou hunting helps people to maintain their cultural identity. Sharing country food still helps to structure and maintain social alliances, and the hunt often assumes the form of a band activity. Above all, the pursuit of caribou is a tie to the land in the midst of profound changes.

Traditional Inuit uses of caribou.

David Nipitnatiak of Cambridge Bay (1987).



PRESENT USE

AN ALBUM OF PHOTOS
COMPILED BY ED HALL AND ELISABETH HADLARI

Guiseppa Bentivengna and Sarah Stephenson of Yellowknife, barbequing caribou steaks and sausages (1988).

Roger Desjardins of Rae during a fall hunt on the barrens (1978).

Skinning a caribou on the barrens (1978).

Wrapping up meat for transport (1978).

George Potfighter and Noel Betsina unloading meat after the hunt is over (1978).

Jacob and Martha Ikinilik of Baker Lake stop on the trail for a cup of tea (1987).

Paul Iquallaq of Gjoa Haven brings home supper (1987).

Jamie Komaksuitiksak wearing a caribou parka made by Mable Nigiyok of Holman (1988).

Juanetta Peddle with trophy (1987).

More than one-third of all resident non-native caribou hunters come from Yellowknife. Above, Jim Peterson and Peter Hart (1985).

Caribou meat drying on racks (1978).

Julia Mackenzie of Rae pounding dry meat (1978).

Johnny and Jane Neyelle of Fort Franklin making babiche from caribou hide (1984).

The Nuliayok Ladies Group making caribou skin kamiks in Gjoa Haven (1987). Above, Mary Kamookak.

Emily Hadlotalik.

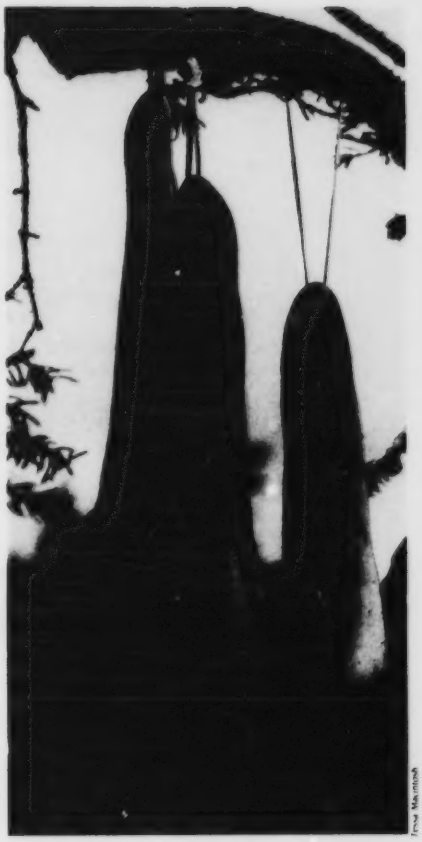
Martha Kogvik

Processing meat in Yellowknife (1988). Above, Len Smith inspects a rack of dried meat.

Bill Coedy wraps up meat for the freezer.

John Stephenson grinds up caribou for hamburger.

Nick Black of Rae skinning caribou heads (1978).



Caribou tongues (1980).

Scenes from the Baker Lake Traditional Camp (1985).

Making a caribou skin kayak.

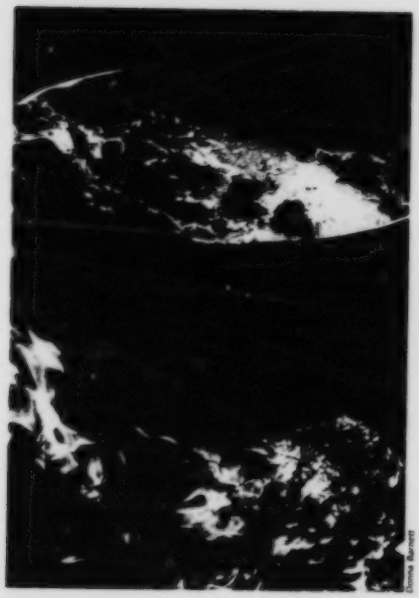
Irene Tiktaalaaq stirring a pot of caribou stew.

A community feast in Rae Lakes (1980).

Caribou ribs roasting before a fire, and fresh-made tea (1978).

John Etibloena of Cambridge Bay (1981).

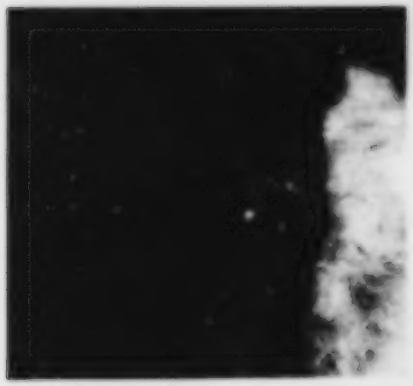
Traditional Dene handgames using drums made from caribou skin (1987).



Caribou stew (1985).

Sandra Stirling of Yellowknife carving a caribou roast (1988).

Jacob Ikinilik of Baker Lake.



CLOTHING

BY JILL OAKES

Inuit in the NWT currently use traditional caribou skin clothing more extensively than any other northern Canadian people. Wearing traditional clothing can mean the difference between life and death for hunters caught in unpredictable storms. This was clearly pointed out during an annual Tungavik Federation of Nunavut meeting in Igloolik when Guy Kakkianium was notified that his son was lost in an October blizzard outside of Pelly Bay. Mr. Kakkianium was extremely concerned and said, "If I only knew for sure that he had skin clothing with him, I would know he was all right."

Inuit elders strongly recommend using caribou skin clothing. They say that over a long period of time under arctic conditions, it is warmer than any southern winter clothing. The physical properties of caribou hair, traditional sewing procedures, and specially designed, time-tested Inuit designs provide excellent insulation against the harsh winter environment.

THE BASIC OUTFIT

A variety of skins such as bird, wolf, dog, seal, and even ground squirrel are used for clothing, but caribou skins are preferred for their insulation and durability. The reason is visible in a microscopic view of a caribou hair. Each hair consists of a network of large, honeycomb-like cells, trapping air which acts as an excellent insulator. Air is also trapped between each of the densely packed hairs, providing additional insulation. When ice and snow collects between the hairs the insulative factor of the garment drops as there are fewer air spaces. The beauty of using caribou skins is that the insulative value is easily restored by beating ice particles free with a wooden or bone beater. This drying technique is impossible to duplicate with modern fabrics. They are dried by evaporation which can be a time-consuming endeavour kilometres away from an electric drier or other heat source.

Insulation is increased by wearing two layers of skin parkas during severely cold weather. An inner layer is worn with the hair towards the inside, and an outer layer with the hair to the outside. Additional layers of caribou skin footwear are worn depending on the temperature, type of activity, and individual preference. The selection includes inner and outer stockings, inner and outer slippers, as well as skin boots. Sometimes an extra pad of skin is brought along to stand on while fishing or waiting at a seal hole.

A pair of skin pants are slipped on over long underwear or fabric pants. Historically, caribou calf skin underwear was used. A few people continue to use skin underwear, although most people say they do not use it because it is too warm. Pants are cut with stove-pipe shaped legs which overlap the boot tops. The waist area is fairly loose, allowing warm air from the legs to rise up and circulate around the torso.

A well-dressed hunter completes his ensemble with a pullover parka and mitts. Mittens are sewn so the skin fits to the natural curvature of a slightly cupped hand. They are usually wrist-length with a bit of fur sewn around the wrist. The strip of fur helps seal the parka sleeve and mitten from cold drafts.

KEY DESIGN FEATURES

A few key design features are incorporated into hunting parkas made by Inuit women across the Canadian arctic in order to produce a warm, durable, and practical garment. Shoulder seams are dropped part way down the back and armhole seams are dropped part way down the arm. These features reduce the amount of strain placed on each seam and create a larger armhole. Large armholes are critical for ease of movement and warmth. Whenever a hunter is chilled, perhaps while waiting at a seal hole or sleeping, he slips his arms out of the sleeves and holds them around his torso. Peter Alareak, from Arviat, said his grandfather also told him to always take his arms out of his sleeves whenever he was sitting around the igloo or his underarms would smell like a weasel!

The hood of a hunter's parka is usually cut in one piece with the back section, eliminating drafts associated with a neck seam. The face edge is trimmed with fur to help calm the wind near the face, creating a calm micro-environment. The hood also acts as a vent. Hot air from the torso rises up to the hood. On cold days the hood is kept on one's head, forcing the heat to escape around the face and thus helping to keep it warm. On warmer days the hood is slipped off, allowing warm body air to escape through the neck opening.

Hunting parkas used to have a waist-length front hemline and a long back tail. By the 1920s, hemlines began to change, becoming longer in the front and shorter in the back. According to Helen Poungat, from Arviat, a legend about a young hunter lost at sea mentions how the short parka tail became popular. On the hunter's journey home he encountered numerous trials and tribulations. In one incident he had to cross between two mountains of ice which were crashing together. He carefully timed his passage, making it through the unstable ice unscathed. He paused to look back just as the ice crashed together, tearing off his parka tail between their jagged edges. Ever since then men wore parkas without long back tails.

Another basic feature seen in traditional Inuit clothing is the pullover design. Openings are omitted, thus eliminating all the problems with malfunctioning, broken, or frozen hardware used for closures. Even when closures work properly they allow a bit of cold air to leak into the garment. The traditional parka is designed to provide optimum warmth with the least amount of repairs. Travellers are always encouraged to bring a needle and thread along with them in case a seam loosens.

Woman's parka from Coppermine. Note the wolverine tassels and Delta Trim. Made by June Klengenberg.

WESTERN ARCTIC

Distinctive style variations exist between sexes, individual communities, and broad regions. Elders can identify where someone is from by looking at slight variations in their caribou skin clothing styles. Obvious differences are noted on a regional level, subtle changes exist between communities.

Copper Inuit from Cambridge Bay, Coppermine, Bathurst Inlet, and Holman Island decorate their hunting and dance parka hemlines with an ornate, handmade border called "Delta Trim." Delta Trim is made by sewing small pieces of light- and dark-haired caribou skin into a geometric pattern. Shaved or dyed skins, rickrack, and yarn is sewn to the geometric design. Some women hand crochet a narrow edging and insert it between the rows of contrasting colours and textures. It takes about a month to make an elaborate band of Delta Trim which is long enough to encircle a parka hemline. Additional pieces are sewn across the sleeves, shoulders, hood, and chest. The lower edge is usually finished with a narrow strip of wolverine.

This region's parkas are also decorated with white-haired caribou skin panels cut in a tusk-like shape. Wolverine tassels are sewn across the sleeves, shoulders, and chest. In the past, wolverine tassels were stained red by rubbing them over crushed rock (litharge) and exchanged between friends at annual winter seal hunting camps. Today tassels are dyed with a concentrated solution of red fabric dye.

The hoods on parkas worn by women and girls are finished with a "sunburst ruff." A sunburst ruff is made by sewing many carefully selected pieces of wolf to a stiff backing. The ruff is then finished with a broad band of wolverine which frames the wearer's face. Men's and boy's parka hoods are trimmed with a single row of wolverine or wolf.

Copper Inuit women carry children on their back, yet they do not sew a carrying pouch into their parka like other Canadian Inuit. Copper Inuit seamstresses simply cut the back pattern wide enough across the shoulder blade area to accommodate the size of a child. To carry a child, it is slipped up under the parka skirt, placed on the woman's back and held in position while a sash is tied around the parka at the waist line. The sash prevents the child from falling through.

KEEWATIN

In the Keewatin, Caribou Inuit men and women wear entirely different parka styles. Caribou Inuit hunting parkas are edged with long, dehaired caribou skin fringes. Three blocks of white-haired skins may be inset across the parka back, and occasionally a band of white-haired skin is sewn along the hemline.

Women wear parkas cut with a long, broad back tail and a short front tail. A large U-shaped hood extends down the back past the waistline. The shoulders are greatly enlarged, causing much speculation as to their pur-

Woman's inner parka (with caribou hair facing inwards) from Arviat. Made by Ulayok Kaviok.

pose. They have been used to store small items, warm up cold hands, and facilitate slipping an infant from the back to the front for breast feeding. These highly fashionable shoulders certainly create a distinctive clothing image. A pouch is sewn into the back of women's parkas in order to carry young children. The side panels of the pouch are enlarged or replaced to accommodate the growing child. Parkas with pouches are extremely practical as they allow the mother to visit and travel with young children. It sure beats pushing a baby carriage across the tundra. Men also wear women's parkas whenever they are babysitting young children. Carrying children in a parka pouch is not only convenient, it also reinforces bonding between parent and child. The pouch is also seen as symbolically representing a second womb.

Traditionally, a pad cut from the neck section of a bull caribou skin was placed at the base of the pouch in order to catch baby droppings. This pad was cleaned by scraping excess fluid and solids off with the brow tine of a caribou antler. The skin was then allowed to freeze and the remaining moisture was beaten out before the pad was reused. About three pads were needed each year as each "diaper" was recycled.

Some inner parkas from this area are decorated with panels of beadwork. Beaded panels are passed from one owner to the next and combined with new panels to create a shimmering legacy of family history. Before beads were available, bones, teeth, bits of skin, and case-skinned weasels were used for decoration. These items were also used as amulets to protect individuals from spirits and to provide good hunting. Today, a few women continue to collect caribou teeth and attach them to the end of their beaded fringes.

BAFFIN ISLAND

On Baffin Island, Inuit women usually wear a parka which has a pouch for a baby and a broad, cape-like hood that falls over the shoulders. The hemline is cut straight across, dropping down a bit at the back. In this region the hemlines of inner and outer parkas are finished with short fringes cut from haired skins. In addition, broad bands of white- and dark-haired skins are sewn along the hemline and hood. It takes about three caribou skins to make this parka style; however, the white decorative bands are cut from the belly area of about seven caribou skins. The Baffin Island style was first reported in the early 1920s and was quickly adopted by Inuit in the east. It has recently become popular in the Keewatin, where it is made from fabric rather than skins.

A few seamstresses in Pangnirtung on Baffin Island sew hoods from skins which leave intact a short length of antler velvet. This is seen on men's, women's, and children's outer parkas. Inuit suggest several reasons for leaving the antler velvet skins on clothing. Some hunters say it is used to make them look more like a caribou, enabling them to approach animals easily. David Oudlakiak of Iqaluit recalls

Woman's parka (with baby inside) from Pangnirtung. Note the short lengths of antler velvet on back of the hood. Made by Mary Battye.

another reason for antler velvet on hoods which was told to him by an elder. The legend describes a hunter who slipped down a snow-covered crevice and was trapped. He was pulled out by his hunting buddy, who used the antler velvet attached to the parka hood as a hand hold.

CHILDREN'S CLOTHING

In each region, boys and girls wear miniature versions of their parent's parka styles. In the Keewatin, girls and boys also wear a parka with a short back tail. As the child grows into new parka sizes, the tail is cut longer. By the time boys reach puberty they stop wearing the tailed parkas and begin wearing men's parkas. In the past, adolescent girls wore parkas with the back tail tied up until they began menstruating. Releasing the ties indicated the readiness of a young lady to get married. Today this style is rarely made from caribou skin. A few are made from fabric.

Playsuits are commonly worn by Inuit children in all Canadian arctic regions. They are often made with the hood, mittens, and boots attached. Traditionally, the crotch area was left unsewn and trimmed with caribou, polar bear, and other skins. This opening enabled children to easily urinate or defecate without having to get undressed. This design feature is still used by some seamstresses.

Caribou skin clothing is a familiar sight on hunts and at special outdoor Christmas festivities, spring festivals, drum dances, and other special occasions. Children from traditional families wear caribou skin clothing throughout the winter while playing outside. However, the common, everyday wear of Inuit people is generally southern style clothing as it meets the needs of their increasingly residential lifestyle. In contrast, southern winter enthusiasts are adopting Inuit parka styles for protection against southern winters.

Traditional caribou skin clothing provides more than protection against harsh winter weather. Between the stitches of each pattern the story of a rich northern heritage is also preserved, to be passed on to the next generation of seamstresses.

Bob Decker

Caribou have been vital to the existence of northern people.

NUTRITION

BY JILL CHRISTENSEN

Dene and Inuit in the NWT are among the last great hunting societies in the world. In pre-contact times they subsisted entirely on what they could kill and gather themselves. They thrived on what was available by developing special ways of handling, preparing, and storing food. Caribou in particular was a staple.

In present times all communities in the NWT have at least one place where food can be purchased. This is a mixed blessing. On the one hand it means that starvation, which was common in previous times, is no longer a threat. On the other hand northern stores are a source of food whose nutritional value is considerably lower and less complete than traditional food. Since the majority of communities are not accessible by road, perishable foods such as fruit, vegetables, and dairy products must be flown in. This means high prices, reduced selection, and irregular availability.

To ensure adequate nutrition, northern health agencies encourage the consumption of food from locally harvested wildlife ("country food"). Since caribou are abundant and available to most people in the NWT, they remain to this day a key source of nutritious food.

UNDERSTANDING NUTRITION

To understand why caribou is so nutritious, we need a basic understanding of the science of nutrition.

Nutrition looks at the food we eat and how it affects our bodies. Food contains nutrients needed by the body to maintain life. Over 50 have been identified. These are divided into six groups: proteins, carbohydrates, fats, vitamins, minerals, and water. Each of these groups has a specific function in the overall picture of promoting and maintaining health.

Guidelines as to requirements for individual nutrients have been

Caribou are a renewable resource.

developed and are presented as Recommended Nutrient Intakes. These are the amounts of specific nutrients required by healthy individuals to maintain health and are dependent on such factors as age, sex, and activity levels.

For ease of use, recommended intakes have been translated into a working plan called Canada's Food Guide. It classifies foods into four groups:

- milk and milk products
- meat and alternates
- fruit and vegetables
- bread and cereals

Dealing with four food groups makes it easier to plan nutritionally balanced meals. Nevertheless, this guide poses limitations for northern use, and as a result an NWT Food Guide has been developed.

CARIBOU — A NUTRIENT DENSE FOOD

A high concentration of nutrients is typical of northern foods. Edible greens, for example, although small in size due to the short growing season, are considerably higher in vitamin content than their domestic counterparts. Such foods are called "nutrient dense." They provide a greater amount of one or more nutrients per calorie than other foods.

Overall, caribou has a high nutrient density. The consumption of all edible parts of caribou provides a majority of nutrients which, in a modern diet, would have to be obtained from a variety of foods. Caribou supplies nutrients which fall under all four food groups — not just meat, but also milk and milk products, bread and cereals, and fruit and vegetables. The only essential nutrient which caribou is deficient in is vitamin D. To obtain sufficient quantities in pre-contact times, people had to use other food sources such as fish liver oil.

It must be emphasized that caribou is such a complete source of nutrients only when used in its entirety. Caribou liver is rich in vitamin C, while caribou muscle is not. If the liver is not eaten, vitamin C must be supplemented by another source.

CARIBOU PARTS
CLASSIFIED BY FOOD GROUPS

MILK AND MILK PRODUCTS	MEAT AND ALTERNATES
soft ends of bones stomach contents intestines	meat, heart, liver, kidneys, brain, blood
BREAD AND CEREALS	**FRUITS AND VEGETABLES**
heart, liver, kidneys bone marrow intestines and web covering stomach	stomach contents eyes, liver

KEY NUTRIENT SOURCES IN CARIBOU

ANIMAL PART	NUTRIENTS
meat	protein, fat, iron, vitamin A, riboflavin, niacin
organ meats (heart, liver, kidney)	protein, iron, vitamins A and C, riboflavin, niacin, thiamin (liver also contains calcium)
blood	iron, protein
bone marrow	fat and small amounts of iron, thiamin, riboflavin, niacin, and vitamin A
intestines and web covering stomach	fat, iron, riboflavin, niacin, calcium
stomach contents	calcium, vitamins A and C, fibre, riboflavin, niacin, and carbohydrates
back fat (tallow)	fat, vitamins A, E, K
soft ends of bones	calcium, phosphorus
brain	fat, protein, vitamin C
eyes	vitamin A

FAT AND PROTEIN

Caribou have a much lower total body-fat content than cows and pigs. Some sources quote a difference of as high as 50%. This results in less "marbling" or interspersion of fat between the muscle fibres and therefore a higher protein count.

Not only is there less fat in caribou, it is also more unsaturated than beef fat. Saturated fat has unhealthy properties which could lead to heart disease. Unsaturated fat is softer than saturated fat and has healthy properties. The unsaturated fat content of beef muscle is 3%, while caribou muscle is considerably higher, at approximately 22%.

The amount and type of fat makes caribou an excellent choice in the prevention of heart disease. Health and Welfare Canada recommends a reduction in total fat intake and the inclusion of unsaturated fats in

PROTEIN AND FAT IN COMMON FOODS
(100 g portions)

ITEM COOKED	PROTEIN (g)	FAT (g)
Caribou	38	1
Beef	17	23
Veal	19	12
Chicken	20	13
Pork	12	45
Lamb	16	28
Canned beef stew	6.5	4.5
Canned luncheon meat	15	25
Bologna	14	30

the diet. Similar recommendations from the Canadian Cancer Society support a decrease in the consumption of fat. Caribou fits nicely into these recommendations. In addition, it has a comparatively low cholesterol content which meets further recommendations by the Canadian Heart Foundation for the prevention of heart disease in susceptible individuals.

Research has shown a remarkably low incidence of heart disease and cancer in those people following a traditional diet in earlier times.

With the settlement of the north has come a trend toward the use of store foods, some of which have displaced a portion of caribou in the diet. Of concern are processed meat products laden with additives and preservatives. Unfortunately, while these foods are easy to obtain and prepare, they are not nutritionally comparable to caribou. Generally, they are higher in fat, lower in protein, and supply considerably more energy. Consumption of these products increases energy intakes which combined with other factors can result in weight problems.

TRADITIONAL DIET

Living in a forested area, the Dene had a greater variety of animal and plant life to draw upon than did the Inuit. In most areas caribou was an important component of the diet. This was complemented with other game, birds, fish from inland waters, and varying amounts of plant foods such as berries, roots, lichen, and wild greens. All parts of the caribou were eaten.

Most Inuit divided their time between hunting on the coast and hunting inland. When on the coast they relied on marine mammals and fish, seaweed, algae, and small amounts of berries. When they moved inland, it was to hunt caribou not only for food but also for bedding and clothing. All edible parts were eaten including the contents of the stomach and the fetus when a pregnant cow was killed in the winter months.

Caribou were traditionally looked upon with great respect. For many groups this determined the way in which the animal was butchered after the kill. Some parts of the animal were culturally prohibited for certain individuals. In both the Inuit and Dene cultures it was taboo to mix resources of the sea or water with resources from the land. Caribou and fish, for example, could not be eaten together or on the same day. Because driftwood came from the sea, Inuit were forbidden to cook caribou over a driftwood fire. Though this prohibition limited the way in which caribou could be prepared, it did ensure that the vitamin C content (which is low in

caribou muscle) was not destroyed.

The traditional diets of both Inuit and Dene were rich in protein and lower in carbohydrates and fat. Energy needs were met by the relatively high intakes of protein. Fat played a secondary role as a source of energy unless food was scarce, in which case the consumption of fat increased. Unlike a modern diet, carbohydrates were not a main source of energy. A typical diet could contain 2 1/2 - 3 1/2 kg of protein foods daily. This is a huge amount in comparison to today's standards, where the recommended daily intake of protein food for adults is about 235 g.

PREPARATION METHODS

The ways in which caribou was prepared were largely determined by lifestyle, cultural taboos, and accessibility to materials for burning. For the Inuit, low energy food preparation methods were a necessity.

The Dene, having access to herbs, roots, and wood in forested areas were able to cook and smoke their meat. Caribou eaten immediately after a kill was usually boiled or roasted over an open fire. Surpluses of meat in the winter months were kept frozen in caches for later use.

Alternate means of preparation and preservation involved drying and smoking. Meat cut into strips was hung on racks to air-dry. Drying and smoking took place in teepee-like structures using herbs or punky wood on an open fire. Dried meat was easy to store, carry, and eat, and could be used over a period of three to four months or longer if frozen. Pulverized dried meat was combined with caribou back fat or bone marrow and berries to make pemmican. This was stored in skin or caribou stomach bags for easy transport and storage.

The rich butter-like marrow from cooked bones was eaten on its own or with meat. The soft end portions of bones were chewed providing another source of nutrients.

The Inuit were more restricted in preparation methods limiting caribou to be eaten in the raw, frozen, or lightly cooked state. Surplus meat from the fall hunt was dressed after the kill and stored in caches for later use. The flavour of the meat was determined by the length of time spent in the cache.

Frozen raw caribou was sliced thin and eaten plain or with caribou fat or bone marrow.

Drying of thin slices of meat on racks in the air was best done in the spring before flies had hatched, thus preventing contamination problems.

While a small portion of meat was lightly cooked over tallow lamps in snow houses, the majority was eaten raw. When lifestyles changed, it became easier to cook caribou and boiling and frying became alternate methods of preparation. All parts of the animal were cooked in this way. The broth produced from boiling was rich from the blood, fat, and bone marrow. Boiled bones were cracked open and the marrow was eaten with frozen or dried meat.

Traditionally blood was consumed as such after the kill, poured into animal intestines to make sausage, or stored in the caribou stomach where it fermented before consumption. In later years its use was broadened as it became an ingredient in soup and stews.

Today, caribou is enjoyed in a variety of ways. While traditional dishes such as roasts, soup, stews, dried meat, and pemmican are still common, caribou for many people has replaced beef in recipes for chili, spaghetti, meatloaves, and stir-fried dishes.

FOOD-BORNE ILLNESSES

Parasites and bacteria are common to many species of game and fish in the north. Improper handling, storage, and cooking of infested meat can result in food-borne illnesses, the symptoms of which range in severity. As high temperatures will destroy most parasites and bacteria, it is advisable to thoroughly cook all meat before eating it.

Caribou are infected by a number of parasites. Cysts in the liver and lungs may harbour tapeworms, while warble fly grubs are often found in summer under the skin along the back. None of these present a problem to human health, even if meat is eaten raw. In fact, warble fly grubs were often eaten by the Inuit.

It should be noted, however, that feeding dogs uncooked caribou meat is not a wise practice, since tapeworms can develop in them and then be passed on to humans.

Brucellosis is a bacterial disease that man acquires by eating or handling infected animals. The disease in humans is difficult to diagnose as symptoms can be mild to severe and can recur for up to 25 years. Symptoms include a temperature which rises and falls, weakness, aches, stomach problems, and general malaise. As the period from contamination to development of the disease varies, it is also difficult to determine the source of contamination. Brucellosis in caribou affects the health of the female in particular. Symptoms are lameness caused by swollen joints, abscesses in the udder or organs, abortion or giving birth to calves so weak they die within a few days, and swelling of the testes. The practice of eating uncooked organ meats, bone marrow, and the fetus can expose humans to contamination. Thorough cooking will kill the bacteria while freezing will not. Care in the butchering and handling of all raw meat is a preventative measure.

Botulism is caused by a naturally occurring toxin which, if not destroyed by thorough cooking before eating, can result in death. The symptoms appear a few hours after eating contaminated food, and include weakness, dizziness, and difficulty in swallowing. Botulism can be a result of poor butchering practices, fermentation of meat, or contamination of meat during the butchering process. Although thorough cooking will destroy the toxin, spoiled meat should not be used.

Salmonella bacteria are found potentially in all protein foods, including caribou, which have not been stored properly. Cramps, chills, vomiting, and diarrhea are symptoms. While thorough cooking will destroy the salmonella bacteria, it is advisable to store meat at cold temperatures as a precaution.

In the field, hunters should always observe a few basic rules when handling meat. Hands and meat should be kept as clean as possible. In summer, this means not allowing meat to touch the ground. Any parts of an animal which look suspicious should not be touched, or allowed to come into contact with the rest of the meat. Care should be taken not to cut into the stomach and intestines, unless of course these are intended to be kept as food; in that case they should be thoroughly cleaned as soon as possible. As with any wild animal, it is always a good idea to wear gloves when skinning or butchering, and (smokers please note) to keep hands away from one's mouth. When finished, hands should always be washed.

RADIATION CONTAMINATION

Lichens are the primary source of food for caribou in winter months. They grow very slowly and obtain their nutrition from moisture. Because of their slow rate of growth, nutrients are more concentrated in them than in other plants. Unfortunately, the radioactive element cesium-137 is concentrated in the same manner. A natural level of this element is therefore expected in caribou. The concentration will vary depending on the location and time of year. Unlike pesticides, cesium-137 does not accumulate in body tissues; it is lost through excretion. This means that caribou will have higher levels of cesium-137 in winter, when they eat mainly lichen, than in summer, when they eat many other items.

Because cesium-137 is a radioactive element, it is a possible cause of cancer. Although a maximum safe limit in meat has been set, there is no

Doug Heard

Caribou — tops in nutrition!

minimum limit, below which there is no risk. Although the possibility of developing disease is extremely small in comparison to other carcinogens, it should be understood that a risk does exist.

The safety of caribou meat had to be re-evaluated following the nuclear disaster at Chernobyl in the USSR in 1986. Dangerous levels of radioactivity rapidly spread to other parts of the world. In Sweden, contamination levels were so high in localized areas that reindeer meat had to be destroyed.

In the NWT the Department of Renewable Resources organized the collection of 1 kg samples from hunters of the Bluenose, Bathurst, Beverly, and Kaminuriak herds, as well as caribou on Baffin and Victoria Islands. These collections took place in November of 1986 and February of 1987. Analysis by Health and Welfare Canada determined that there was an increase in radiation levels of between 10% and 25%. They were highest in caribou from around Yellowknife and lowest in samples taken from the Inuvik region. Despite this increase, the values were still so low that there was no recommendation against the use of caribou.

A CHANGING NORTH

Sweeping changes have occurred in all aspects of life in the NWT in recent decades. Though the migratory whims of caribou no longer spell life and death for people, the great herds remain a vital resource.

Modern equipment has made hunting easier, yet the increasing number of wage-earners has meant a reduction in available hunting time. This latter trend coupled with the convenience of store foods has resulted in a decrease in the amount of caribou eaten per person, as well as in the variety of parts consumed. The result is that people in small settlements must make a special effort to eat nutritious and balanced meals.

In the NWT elders and nutrition experts agree: eating caribou promotes health.

One day Oonark's husband went hunting.

STORIES AND LEGENDS

"THIS STORY BEGINS WHEN I WAS A SMALL CHILD"

This story begins when I was a small child. My mother died before I was a year old, and the only brother I had was married. I lived with many different families. When one family didn't want me I would go to another. My father was living, but he had to be looked after by other families also, because he was not able to walk. Sometimes when we moved from one hunting place to another I would be afraid that they would leave my father behind, but they didn't, they just carried him on their backs.

One time when hunting was very poor, we had to kill a dog. I was very hungry, but would not eat any. They told me I had to, because that was all the food we had. I finally ate some, then someone told me it tasted like wolf and I got sick. That was when my father died, because we didn't have enough food. I went to live with my brother and his wife then.

Hunting was still very poor and as much as I hated to, we had to live on dog. My brother and his wife and I went out alone, to look for our uncle's camp. On the way, we ran across some food that someone left behind. We ate what we could and put the rest on our backs. It didn't last very long, because we were hungry. It got very foggy, so we had to sit it out. When it started to clear up, we saw a rabbit which my brother caught. We then built an igloo, cooked up the meat and that was all the food we had for awhile.

The next day all we drank was water, and that was all the water we had for a long time. We didn't eat snow, for if you eat snow when you are thirsty, it just makes it worse. We only had a snow knife and a rifle with us so we couldn't make a hole in the ice.

By this time, my sister-in-law was very weak. We would build an igloo

for the night, and in the morning we started off again. But in her weak state, she would be left far behind. We finally came to our old camp where we spent the early part of the winter.

We opened the old igloo. The place smelt like it was full of food, but there was only some old caribou skin and some bones that we chewed on for awhile. Suddenly, my brother remembered where he had hidden some caribou meat some time ago, and we went out to look for it. We found the meat and were very glad. We just sat down right there and ate. We took a piece back to the igloo for my sister-in-law. She stayed to rest. After we finished eating, we were very thirsty. We stayed at one place now and went out hunting everyday but never got anything. We were getting hungry again. One day when we were returning to our igloo, we saw some people waiting for us. They seemed happy because they had food and water. All I wanted was water. I kept drinking until someone told me I could get sick if I drank too much. The next day after we ate, we went with the other people. It was late spring now, and we could travel at night.

One day Oonark's husband went off hunting alone since my brother was still weak. We were coming behind with Oonark's three dogs, when we spotted seven caribou. My brother got up and went after them. He got them all. It seemed like we had a lot of meat now, so we just camped where we were. It was now getting into summer, and we had to go back and get our belongings. My brother couldn't remember where we left them. I had to lead the way, because I was good at remembering places.

Oonark now had a baby and we were running short of food again, so we started to move on to look for more caribou. It wasn't long before we saw six more. We got all the caribou and started to move on to where Oonark's husband built his camp, but on the way there my sister-in-law had a baby, so we had to stop for awhile. It seemed like we were always running short of caribou, and we were also running short of gun shells. While we were moving on to the camp, I saw something move. It was a caribou, my brother said. He only had one shell left and he didn't want to miss, but he was lucky and got it. By this time Oonark and her family moved on further.

My brother and I decided to move on. We came across a lot of things people had left behind. We waited beside their belongings thinking they would come back for them. While waiting there, some other people, who were also looking for a better camp, stopped. They stayed with us. We were glad because we were not alone now. After a few days my brother told me I had to stay at the camp, and he was going on. I didn't want to, but was told I had to, so I did. It was very hard for me, because this was the first time my brother left me alone since my father died.

It was in the late fall that my brother came back for me. I was very glad to see him. He said he was going to take me home. I couldn't sleep all that night. I was very happy. When we got home, once again I had to live with Oonark, but I didn't mind. While I was there, Arviqtalik and her family came. I was told I had to live with them. I didn't want to because I had never seen them before. I lived with many families until I got married.

Told by Marion Anguhalluq, Baker Lake
Reprinted from *Northern People*

"I AM GOING TO TELL YOU A SAD BUT TRUE STORY"

I am going to tell you a sad but true story, as it was told to me by my mother, when I was just a child.

Kalluk, my great grandmother, had a son Aleeyak, they lived in a time of great starvation. They had a bit of seal blubber, but it was nearly gone, and now had to depend on fish. All the other people in their camp did not survive. After each fishing trip,

The moss in the raft was making a crackling noise.

they always went back to the camp, but Aleeyak soon grew afraid of all the dead people, so they moved to another lake and built a new igloo. Aleeyak was young, so the burden of getting the food was up to Kalluk. To take him along to the fishing holes, she cut a hole in a sealskin oil bag and pulled it like a sled.

When no fish were caught, Kalluk would cut pieces off the bag and give them to him to chew on. One day Aleeyak saw a caribou. Kalluk did not have a rifle, but they thought of a way to catch it (I don't know how they caught it). She wanted her son to eat all he wanted, before she would eat any herself.

It was now spring, they were still living in the igloo. The ice was soft and they could easily cut a hole with a snowknife. One day a man came. They had not seen anyone since everyone died in their camp. He wanted to marry Kalluk, but she refused. The day the man decided to leave he took the ice chisel to spite Kalluk for her refusal of marriage. She fought to get it back but he was too strong for her. Kalluk was worried for her son, but since it was spring the snowknife could do the job of the chisel and fish were easily caught.

One day another hunter came and saw they were alone. He wanted to take them back to his camp. At first she didn't want to, but the hunter told her that Aleeyak should be with other people, so they went with the hunter. Survival was no longer a problem, the camp had enough food for all. They later heard that the hunter who took their ice chisel was dead. He starved to death.

People kept telling Kalluk to marry the hunter that found them, but she refused. One day she finally gave in and they were married. Kalluk now had two more sons called Scottie and Tapatai.

As a child I remember another time of great hunger. All we had to eat was ptarmigan, and even they were scarce, small, and not very filling. We were always very happy when someone got one, as we were always hungry

In those days we didn't have canoes for transportation, but had to walk. We only used to carry useful items such as ammunition when in search of food. Someone spotted caribou across the river but there was no way to get across.

My father told us to gather moss. We didn't know why but we all worked until we had a big pile. I wondered what the reason was, but didn't question Father as I knew he had a good reason. Father then took

four caribou skins, tied two together with thorns and sticks. He now had a raft. Before we tried to cross, the men tested it and it worked well. It carried four of us across, two men paddled while two of us lay flat. It was scary as the moss in the raft was making a crackling noise and I could see big rocks in the river. I was scared but having fun at the same time. Soon everyone was across including the dogs and belongings. We then dried the skins as we had to use them for mattresses that night. We were anxious to hunt but had to scrape mud off the skins and set up camp first. That night we went to bed without food and feeling very hungry.

I remember a very frightening incident when I was a child. Caribou hunting was poor where we were camped, so we moved to land where caribou were plentiful and built our igloos. There were a lot of us and Scottie and Tooloogattoark were acting as my guardians.

One night the dogs woke us up. They were running all over the igloo, and making a lot of noise. My father got up quickly and started to dress so he could go out and see what was wrong. Mother wanted to put the kudlik on but Father said no. The darkness and noise of the dogs made me huddle close to my Mother for comfort. Father was out for a long time and I felt sure he had been eaten by the wolves. I could feel my Mother was scared, but she tried not to show it.

Finally, Father came in and said there was a pack of wolves attacking the dogs. The wolves had killed one dog that had belonged to a friend, but none of our dogs were hurt. The belly of the dog was torn apart and the skin flipped over its legs. Our dogs were in a pack, and when Father went out, they came to him. Father and the dogs then approached their enemy, the wolves. Father shot two wolves and the others ran away.

Another true and frightening story I remember and will never forget is about Scottie's grandmother, Nungnik. It was in times of hunger and every day after waking we went fishing. Nungnik was very weak from old age and had an arm that was useless.

One evening as we returned from fishing, we heard her calling for help. We rushed inside and found her lying on the floor, away from her warm bed. Scottie and his son put her back on the bed, and saw that her head was frozen. She told us she struggled to get back on the bed but couldn't make it with only one arm. Nungnik spent the whole day this way, and knew no one would return until late. It was too much for her, and she passed away that night.

Long ago, in Arviat, a tribe of Eskimos called Padlemiut, were having a drum dance in a large tent. My mother wanted to take me in, but I did not want to go. I was shy and scared of people. Drums were pounding, people were shouting and singing, which frightened me even more. Mother wanted to go in so badly that she put my head under her atigee so I couldn't see. I tried to struggle free by biting my mother as hard as I could. Mother was stronger and I had to enter the tent. I will never forget this incident.

In the old days, unlike today, children were shy and afraid to visit people. It is a change I have noticed over the years. Perhaps it is because they are more educated.

Another time I was at a drum dance in the winter. I got very thirsty. Someone offered me a cup made out of caribou skin, but it was filled with ice and I couldn't drink it. In those days we only had one cup, which had many uses. It was used for drinking tea and water, and even to pour water over the komatik runners.

Sometimes when the shamen were present, the drum dances got good and people would do anything. Today we just dance, there are no more shamen.

Once when I was very ill as a child, Mother and Father were worried and asked the shaman to cure me. Strict instructions were given to my parents that they must not interfere and that he must be allowed

to do whatever he wanted to heal me. When they agreed, he told them he was going to stab me. Even though I was sick and could hardly move, he made me stand up along with my parents. As I was standing, I saw a caribou skin mattress, but I did not know what it was to be used for.

Mother and Father seemed surprised when they saw the fringes and decorations on the shaman's parka. He had many things hanging from his parka, and when he moved, they also moved to and fro.

He was now ready, and suddenly something went through my body. I was supposed to say "ahaahh" (it hurts), but instead I said "ikkii" (it's cold), as what he used to stab me with was cold.

I don't recall but I was told later that I blacked out and fell on the caribou skin mattress and he covered me with a blanket. When the shaman stabbed me, he was trying to make me a shaman, but my parents told him not to, that I was too young and didn't know anything yet. I was very afraid that time, but life was exciting.

Told by Martha Talerook, Baker Lake
Reprinted from *Northern People*

THE BOY WHO FOUND THE LOST TRIBE OF CARIBOU

A group of Eskimos lived along the seashore. There was a great hunter, to whom they looked as their ruler. He was not only a great hunter, but also very kind and treated everyone equally.

Now there lived a poor boy whose parents had died and he was living with his grandparents, who were very old. The ruler, knowing this, called the boy over to his place and asked him if he would do odd chores for him. He would always make sure the boy and his grandparents had something to eat. The boy was very glad and he ran home and told his grandfather and grandmother.

Now the ruler also had three sons who were always very kind to the boy and had always played with him, and now they would even jokingly call him "little brother," and this gave him courage to learn all they could teach him. They would often play games of all kinds. They practised shooting with a bow and arrows, but the game he liked most of all was "harpooning the seal." One of them with a sealskin rope would run past the others who were standing in a row, each with a sharp stick. They would try to hit a loop in the rope with their sticks. The one who hit the loop would take his turn with the rope.

As time went by, the boy's grandparents passed away and the boy was very sad. One day the boys came over and said, "Our father would like to see you. I believe he has some news he wants to tell you." As he sat at the home of the ruler, he was very quiet as the ruler spoke to him. The news was good indeed. The ruler wanted to take him in as one of his own sons and teach him about hunting, after he was a bit older. He ran over and told the boys, and even as he was telling them, he knew the boys had put this up to their father.

The years went by and he became a boy whom no one could beat in sports. One winter he was allowed to go out hunting, but he had to listen to all that was said in the meeting before the hunt. The hunt was very good. They had almost enough meat to last through the long winter. The ruler then decided to teach the boy how to get a caribou with a knife, without the use of a bow and arrow. The boy was now very excited, for he was always anxious to learn of new ways in catching his game.

They had to use a skin to cover themselves with and sneak up to the herd till they were close, and then use a knife to kill. It had to be placed in just the right spot.

When it was time for him to try this new way of hunting, he crept very close to some caribou. But just as he was ready to spring, the caribou spoke to him. "You must be using my

He was wounded in the neck by an arrow.

brother's skin to cover yourself with. Why don't you put it on the right way and I will tell you what to do?" Was he going mad, or was the caribou really speaking to him? The caribou continued:

"Those of us who are to be leaders in the future have this gift of being able to lift the face-mask, and so we are able to speak on behalf of our people. Now close your eyes and slip the coat on, and I'll tell you more as we travel. Hurry, for we do not have much time." He did as he was told, and to his surprise, he was now a caribou. "Follow me," the caribou said, and now they were all travelling at a great speed.

After a bit he saw that he was getting left behind, and now he stumbled. He didn't know how far they had gone when he heard a voice saying, "We are safe now, and you can have a rest. We have been going for a good half-a-day, and now I will tell you how we travel. When we are running at high speed, we never look back at the ground. This slows you down. Hold your head high and just look where the ground meets the sky, and run. This way you can see your direction and also anything that may be on the ground to trip you. I will give you a test run after you have had a little more rest."

They ran and soon the ground below him seemed to be a blur. Soon they turned and they were on their way back to the herd.

Once back he realized that he was hungry. As they fed on the sweet lichen, his friend told him, "You must never stray far from us, till we have told you more of the dangers we face in life."

To his surprise, there was a lot he had to learn. First of all he was told never to go near anything if he was not sure what it was. He was told of wolves, and to always stay with the herd when in danger. Also there would be times when they would be hunted by humans.

Now the air was cool and there was snow on the ground. The next day they had a long journey to make, and the only time they would stop was in the evening to feed and bed down. To his surprise, there were a few browsing around and feeding. He looked around and dug in the snow, but there were no lichens he could find.

His friend came over to him and said, "I will have to show you how to search for food in the winter. However, you must not waste any food when you eat. You must always eat all you find, for those who waste food don't always find food when the

chips are down." He took him aside and told him to dig in the snow and turn up the ground. To his surprise, there were berries and fresh plants. They were very delicious and he ate all he had found. Now his friend told him, "Never dig for food till you are hungry. That is our way of life."

The winter was long and the days grew short, and there were times when he bedded down without anything to eat, for he would be too tired to eat. And then he would be up very early for another long day.

Two or three times they had to remain in one spot on account of storms. These were the times they rested and he was told many strange stories. They told him of humans who would at times look like things they weren't. Some of them would seem to glow. As for others, they looked strange and dirty. The ones who looked dirty were the ones who were lazy and always liked to sleep long. Others who were great at hunting and early to rise were always tempting to them.

Soon the days were long and the sun shone very warm. Spring was here and now they were to watch even more carefully than before, for they were now passing a very dangerous country where a different tribe of Inuit lived. Water was beginning to show in some places.

One day they were attacked, and he was wounded in the neck by what he knew to be an arrow. To his own surprise, he was able to slip out of his coat. He was now back in human form. To his surprise, there was his hunting knife still in his belt.

Now as he lay where he had fallen, one of the hunters came running to his aid. He looked in awe and wonder as he saw he was from a different tribe. At last he spoke, and asked, "Where did you come from? For I know your tribe of people. From a long ways back I have heard many stories and tales of them."

He told him what had happened, and as he spoke, he saw others come and they were listening as well. After applying some kind of spruce tree gum to his wound, they built a fire and had some roasted meat like he had never tasted before. At first he was a little slow in eating, for he remembered the friends he had made. Soon he was over it and he enjoyed his meal. He helped in preparing the meat to pack, for now he was told that he was now one of the tribe.

Told by Donald Kaglik
Inuvik

CARIBOU TALES FROM BAFFIN ISLAND

There are many different kinds of caribou on Baffin Island. One kind can change into a half-human, half-caribou form, and runs only on its hind legs. This kind of caribou you can get close to without it running away. If you shoot at it and miss you will know it is this kind. You must not shoot again. As the other animals begin to wander off or gallop away, this one will rear up on its hind legs and run, catching up very quickly with the others.

One type of caribou lives far inland and is hostile to people. Friendly caribou will help people if they are confronted by hostile caribou and, when attacked, may even bring them back to life. Friendly caribou can also change into human beings. This occurs during a mirage, when there is no wind and the sun is shining brightly and the land seems to move in waves. Sometimes the waves cause the rocks to break into pieces. The experience can be very frightening.

Some people when hunting alone have fallen asleep on the tundra, and been carried away by caribou. At such times they may be taken anywhere in the world. It's just like a dream, for when you awake you are back where you began and the caribou are gone.

Sometimes when you are hunting for caribou and walking slowly, you may hear a whistling sound mixed in with the wind. This sound is actually a song. The words cannot be under-

One kind runs only on its hind legs.

stood but you will hear many voices with one voice dominating the rest. It is impossible to tell where the song originates from, or whether it is near or far. When listening to these songs, caribou may suddenly appear right in front of you. They appear out of a mirage mixed with a rainbow. The mirage approaches and goes in circles at the same time. The land seems to move and there is no place to hide or run away. All of this is caused by another kind of caribou called *Inualuit*. Recalling the melody is a pleasant memory, especially when you are unable to go hunting at a another time.

Inualuit live underground and can accomplish feats impossible for human beings. Their homes have bright lights on the ceilings and are wonderful to behold. People who have dwelt with these beings have liked it so much there that they have wanted to return.

I was told I had an uncle named Sangoya who had an Inualuke wife and two children. The younger child professed to be a real Inuk (human being). This uncle of mine said he no longer wanted to have Inuit status, so he stayed with his Inualuit family and friends. He said more than once that he would dwell with them until the second coming of Jesus. And when that occurred he would immediately go to heaven with the Inualuit.

Inualuit are not always friendly. There is a story about one man who had dwelt with Inualuit, and who was out hunting on foot one day with another person. Suddenly the ground opened up and swallowed the other person. It is not known if he ever returned from underground, but it is thought that the more subtle Inualuit were responsible for this and ate the hunter.

Afterwards, when the hunter who escaped the ordeal got back home, he taught some people how Inualuit sing songs. He formed a circle of people around him and sang:

AIPPATISAMING AAJURSAPAKKAMA
AIPPATITSARUNNA AJURNARUNNAIR-
MAAN AIJAIJAA
AIPPARA TAINNA
QIMATTAULAURMAAN
AIPPATISARUNNA AJURNARUNNIR-
MANN AIJAIJAA

As he sang, his voice faded away every now and then exactly in the

same way as the Inualuit when they sing.

I know these may sound like fairy tales to you, but they are not.

Told by Appitaq Sanguya
Clyde River, 1985
Translated by Mary Nashook
and Pallaya Ezekiel

THE RAVEN AND THE CARIBOU

It is believed that in the old days people had strong powers or medicine. Each person had the medicine to change themselves into almost any kind of animal. Life was so difficult in those days that they needed these powers in order to survive. In the following legend, the animals are really all people.

This story takes place a long time ago with a group of people living together in a small gathering of branch shelters. The people were starving. They had not seen any caribou for a long time.

During these days in which the people were starving, a certain raven kept flying overhead quite happily. The people knew that the raven lived away from them in a shelter of his own but they did not know exactly where. The little snowbirds were living with him.

Each day the people would watch the raven and wonder why he looked so healthy and happy while they themselves were starving. They decided that he must know the whereabouts of some caribou so they asked the raven about this. "No," said the raven, "even though I am flying around all day I do not see any caribou tracks."

The people listened to the raven but they decided to follow his tracks. Once they did this, they came upon a tree. The raven had put some caribou eyeballs on a stick and left the stick in the tree. The people took the eyeballs on the stick back to a house to have a meeting about it. They wanted to make plans because they knew the raven was lying to them.

Using all their medicine the people tried to decide who among them would be the most powerful person to go after the raven. The one with the most medicine would be the one to follow the raven's trail. Perhaps he could find out if the raven was hiding caribou!

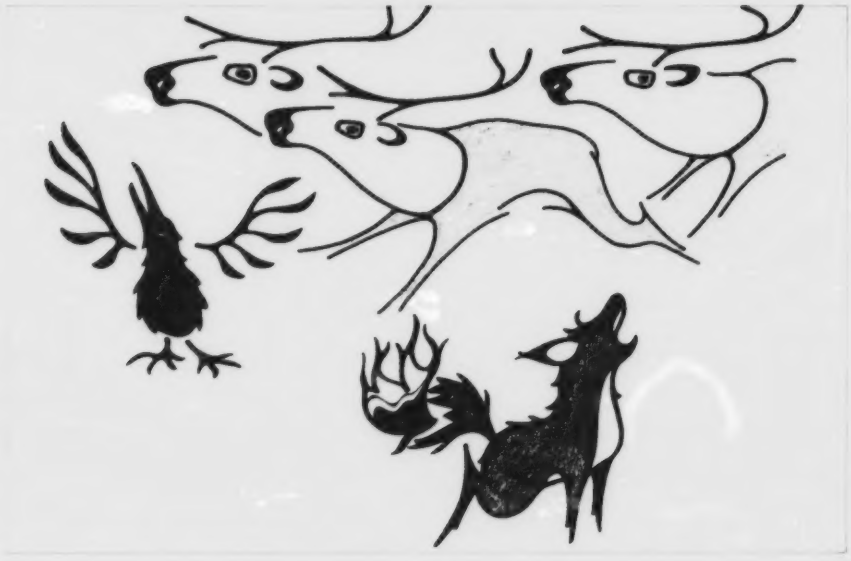
Inside the shelter the people sat around the fire, singing and chanting to the powerful medicine man. "Go and see where the raven lives! Go and see where the raven lives!" In a deep trance, the man changed into a hawk in order to fly around in search of the raven. It was foggy, however, and he could not see. "Put some ashes from the fire over my eyes," he said, "then I will be able to see more clearly." The people took some ashes and put a black line over his eyes. Soon the man could see more clearly. His medicine grew very strong and he could see the direction in which the raven lived.

In the meantime, the raven had strong medicine of his own. He was able to hide many caribou using his medicine to make a type of wall around the caribou.

Back at the house, another man decided to use his medicine and travel as a fox to try and get to the raven. He found the raven's tracks and followed them to the raven's shelter.

The raven had built a fire by his doorway so that as soon as the fox rushed inside, his tail caught fire. At the same time, the wind rushed in the door and caused the smoke from the fire to billow and fill the room. This scared the caribou, who were also gathered in the room, and they all ran out of the shelter crushing the raven as they went. All that was left of the raven was his black feathers, spread all over the ground.

This raven was special to the people. He possessed strong medicine and could see into the future. The people did not want to be without him in spite of how he had tricked them. They gathered up all his feathers and used their medicine to put him back together as a raven again.



As soon as the fox rushed inside, his tail caught fire.

The fox had not been lucky. He had scared all the caribou away. Even to this very day, some men will not wear any fox fur on their clothing when they go hunting. They believe that if they did, the caribou would run away from them, just as they ran away from the fox.

Told by Pierre Judas
Translated by Madelaine Judas
Collected by Wendy Stephenson
Snare Lake, 1983

THE HOOF BABY

A long time ago, an old woman was living alone among a group of people. In those days the people were always travelling in order to stay close to the caribou. They depended on the caribou for their lives. This particular group of people decided to leave the spot they were camped at and travel on. The old woman was left behind.

All alone and partially blind the old woman was left in her shelter made from branches with snow piled round it. As she sat quietly by the fire it began to get dark outside. In the quiet of the night she could hear sounds. The sounds were much like that of a baby crying.

Wanting to see what was making these sounds, the old woman crept out of her hut and found many, many caribou tracks. In one of the hoofprints was a very tiny baby boy. The old woman took the baby back to her shelter.

In these days of long ago, people used to kill and eat ravens for food. The woman fed the tiny baby on the powder from the dried liver of the raven. Whenever she went outside she would keep the baby inside her fur coat to keep him warm. She fed and cared for the little boy as well as she could and soon he began to walk.

When the little boy could talk he asked his granny to make him a bow and arrow for hunting. This she did and he kept the bow and arrow by his side.

One night the old woman decided to check on the boy while he was sleeping. He was sleeping in a warm raven feather blanket. When the old woman opened the blanket the boy was not there! Later on that night she checked again and the boy was there, sleeping peacefully.

The next morning the boy told his granny where he had been the night before. "We were playing on the same lake where you found me. Let's go and see what we were playing with." The boy and his granny walked back to the spot he had told her

He grabbed the bucket of grease and took off to the moon.

about. When they came to the lake they saw that the little boy had used his new bow and arrow to kill many caribou. They spent the rest of that day cutting up the caribou meat.

The little boy never grew to be very big. He remained very small because he had been born out of a caribou's hoof. The old woman told the boy the story of how she had raised him from the time she found him as a tiny baby lying in the caribou track. She also told the boy stories about his uncle who lived far away from them. As a result of these stories the little boy grew curious and wanted to see where his uncle lived.

Whenever the boy wanted to travel a long way he had the power to change himself into a caribou calf. This he did and off he went to see where his uncle was living. By the time he had travelled that long distance it was dark and all the people were asleep in their hut of branches and snow. As a sign that he had been there, the little boy left a caribou chin stuck on a long stick by the door of the hut. Then he travelled back home.

It was not until the next morning that the uncle noticed the stick by his doorway. When he and his people looked outside they saw caribou tracks leading away from the hut. They were very hungry for caribou meat so they decided to follow the caribou tracks.

When the uncle and his people arrived at the old woman's hut she told them the story of how the little boy had been born out of the hoof of a caribou. She and the boy were living well with a lot of caribou meat to eat.

Seeing this, the uncle and his people moved to the spot where the old woman lived. One day, the little boy told his granny to make him some grease from the fat in between the two sides of a caribou hoof. "If you make a bucket of grease," he said, "don't let my uncle put his finger into it to taste it." But before his granny could tell the uncle, he had put his finger right into the grease.

Without even looking at the grease the boy knew that his uncle had put his finger into it. This made the boy very angry and suddenly he grabbed the bark bucket of grease and took off to the moon.

On a clear night, when the moon is full and bright, take a close look at it. If you look carefully you can see the little "hoof baby" with his bucket of grease.

Told by Pierre Judas
Translated by Madelaine Judas
Collected by Wendy Stephenson
Snare Lake, 1983

THE BOY WHO WAS BORN TWICE

A little boy was living in a fish camp with his parents. His father was an accomplished hunter and his mother was skillful at sewing and cooking. One day the little boy somehow got separated from them and became lost. He had never been alone before and was very frightened. As he walked along the shore of the lake he spied a family of geese, and was so lonely that he sat down on the beach just to hear their voices. Watched over by their mother, the young goslings were playing and feeding in the shallows. After a while they began to move away, so the little boy quietly slipped into the water and swam after them. Soon he was quite close to them, but they didn't seem to mind his presence. In a short time he was playing with them and for a while at least he forgot his predicament.

Suddenly the mother called them together and commanded each one to honk. Thinking it was some kind of test, and not wanting to betray his identity, the boy did as he was told. Luckily he had heard his father call geese, so he knew what to do.

Then, ordering her brood to follow her, the mother dove underwater and swam far out into the lake. When they surfaced a great wind had arisen and the water was churned up into huge waves. The boy was very happy because he thought he had passed the test, but what had actually happened was that the mother had seen people approaching and was merely getting her family to safety. When the people heard the geese honk, and the wind suddenly rose at the same time, they grew frightened and fled.

The little boy knew nothing of this. He was happy to have a mother again, and to be among friends, and to be no longer cold and hungry. He

He decided to become a human agai

was also quite pleased with his own resourcefulness, until one day he saw his reflection in the water. Imagine his surprise when he discovered that he had a beak and feathers just like the other goslings. Somehow he had turned into a goose.

He lived with the geese for several years, and though they never suspected he was different, there was one thing which set him apart from them — his curiosity. He found himself becoming more and more restless, and wondering about the other animals he saw around him. One day he saw a fish swimming nearby and decided he had spent enough time with the geese. Without hesitation he dove under water and changed into a fish. He lived that way for a long time, learning all about fish — what they do, what they eat, where they go.

People knew there was something special about him because he never got caught in their nets. Whenever he saw a net, he always swam the other way.

He changed into other animals too, living with them for a long time and learning their ways. He was a moose for a while, and also a bear. When he was a bear he ate all the things bears eat — fish, berries, roots, the tips of willows. When winter came he looked for a good hiding place so people wouldn't find him. He was still a young cub. He met an old bear who knew where there was a cave they could use. He showed the cub how to turn his little toe in a certain direction so that anyone tracking him would go in that direction. Though they slept all winter in the cave, it seemed like just one night. Once they woke up in the middle of winter and the cub was very hungry. The old bear showed him how they could get some lunch. The soles of their paws grow throughout the winter. This growth tastes just like pemmican. This is what they ate.

In the springtime when the snow had melted a little, they woke up again. The cub said, "Grandfather, there's water dripping at the door."

But the old bear said, "There's still lots of snow, no use to go outside, better stay in bed."

In this way the little boy learned all about bears.

Finally he saw some caribou and decided it was time to change again. Only this time he went to the mother caribou and was born a baby caribou. And after a while it so happened that his own father was in the bush hunting caribou. He saw the young caribou and knew immediately there was something different about it, so he shot it. He sent his wife to fetch it with the sleigh. Though the caribou was dead, his spirit was still present, and he saw that the man and woman were good people. The man was a fine hunter, and the woman a good wife, so the boy decided to become a human again. He knew they would look after him well.

Sometime later the woman gave birth to a son. Her husband said the child would become a great man. The little boy grew up to be a mighty hunter and flawless fisherman. The reason he was so expert was because he had lived with all kinds of animals and he knew their ways better than anyone else.

Told by Johnny Neyelle
Recorded by Ed Hall
Fort Franklin, 1983

CARIBOU MEDICINE

My grandfather was one of the top medicine men in the country. He had medicine for every living thing in the world, including space, wind, trees, everything that grows, everything. Medicine is something that comes unbidden to people, not because they want it, it comes from nature or God. Nobody can explain it and most people don't talk about it because it's sacred to them. They die with it, they don't say how they possessed it.

But my grandfather didn't like it. He came from Aklavik originally and he was there when the first white men came into the country. When the first priest came to Aklavik, my grandfather

All my life I have controlled barren-ground caribou.

went to see him. He said, "I am very powerful myself, but I don't like what I have. I'd like to get rid of it. I'd like to live like ordinary people. It's not my fault I'm this way, somebody or something pushed it on me. Even before I was born I had it. I picked my own mother and all this power came into the world with me."

But the priest told him he couldn't do anything about it, all he could do was pray over him and tell him to try not to use it. So grandfather took his advice and he was pretty quiet about it all his life. He did do some wonderful things — in trapping and killing things other people couldn't, he also helped the poor and healed the sick. There were other medicine men too, who did exercise their power. Medicine was very important in those days, just like money is today. If you had it, you felt good; if you didn't have it, you didn't feel good. My grandfather had grandchildren, for instance, and their parents wanted them to sleep with him so they would receive some of his medicine power. Three boys, one of them my father, slept with him and they all got some, which they do exercise sometimes.

In 1926, however, a great disaster came upon the Dene people of the NWT. Before then, all Dene depended on medicine, all their laws and culture were based on medicine power. At that time there were only four top medicine men in the NWT and they controlled all the other medicine people. But in 1926 two of them quarrelled in public. One accused the other, saying, "You killed my son." They threatened each other, and one of them said, "If you kill me, I will take all the medicine people with me." Three days later they both got sick and died, one in the morning and the other in the evening. That was when the great flu epidemic started. Over half of the Dene population of the NWT died, most of them medicine people. Today we have very few medicine people left.

To be a strong medicine person you have to go and live by medicine

laws. All Dene culture comes from this medicine. Today people no longer follow medicine laws because our lifestyle has changed so much. Today people live just like ordinary people. Medicine power is just a memory.

My grandfather was one of those who died in the flu epidemic. On his death bed, he confessed to his relatives and grandchildren how strong his medicine was. He said he followed the advice of the first priest who came into that country, but regretted it. He could have used his power to help his people in many ways — caribou, for instance.

"All my life I have controlled barren-ground caribou," he said. "I once was a caribou. I can speak to caribou. I direct all caribou movements on the barren-land. After I was a caribou I became a person. This is the third time I've been incarnated as a person. After this I will die just as an ordinary person dies. I will not come back.

"I regret that I never pushed the caribou around the bush so that people would have good hunting. The reason I didn't was because I didn't want to show off. I didn't want people to bother me too much, so I kept it to myself. In the past I kept all the caribou in one bunch and made them move all together. That way I figured they would protect themselves. I didn't like them to go into the bush too much because I thought they would suffer, maybe from too much snow, or a lot of hunters would overkill what they need, the wolves would get more. I figured they were better off on the barrens. In the fall they would go close to the treeline, in the spring they would go back to a special place where they could have their young. All the females would go in a circle and all the bulls would go around the outside. I have never been there myself but I went there with my medicine.

"In all this time I have controlled and protected the caribou by doing these things, but now our medicine is leaving us and I see nobody to replace me. Because of this I will predict what caribou movements will be like in the future."

My grandfather then said that within the lifetime of his children they would see the caribou come all around Bear Lake, and between there and the Mackenzie River, close to Good Hope and Norman and Colville, close to Wrigley, Simpson, Lac La Martre, Providence, all those places, and the caribou will also go across Slave Lake. This actually happened in 1945, somewhere around there. During one year great numbers of caribou came all around Bear Lake in October. All the hunters and trappers from Colville and Norman and Good Hope made real use of those caribou. Even around Fort Franklin they were still there in May. The ducks came, the caribou were running all over, people were shooting ducks and caribou at the same time. People had a lot of fun, there was lots of dry meat that summer.

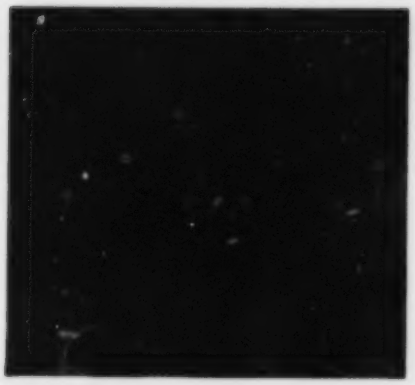
And that's the last time that we remember caribou around here in great numbers. People still talk about it, they say, oh that's the time there were a lot of caribou, we haven't seen caribou in large numbers since then. People still get caribou but they have to go a long way for it.

Ever since then caribou movements have changed. They are erratic, sometimes they disappear as though they're decreasing. A lot of elders who've lived a long time have a little knowledge of caribou, they keep talking about how the caribou don't go where they're supposed to. With no one to control them, they go all over the country, they split up and go wherever they want to, and as a result they're on the decrease. Maybe because of people killing too much, or because of wolves, or because of some other reason.

All this my grandfather predicted before he died. That winter people say two caribou came and stood on his grave in Fort Norman.

Told by George Blondin
Recorded by Ed Hall
Fort Franklin, 1983

Growing antlers are covered in velvet.



BIOLOGY

BY DOUG URQUHART

"Stags far greater than ours" was the description given by John Cabot in 1497 of caribou inhabiting the island he called "Newfoundland." The early French explorers called them *caribou*, likely after the Micmac word *xalibu*, meaning "pawer" or "shoveller," so named for their habit of removing snow with the forefoot to reach food. Although the arctic explorers and Hudson's Bay Company traders could have adopted the Inuit word *tuktu*, they preferred the European term *reindeer* and generally referred to them as "the deer" in their journals.

All European names apparently derive from the Lappish word *reino*, meaning a young reindeer. Around 1500 A.D. the Old French Versions were *rangier* and *rangifere*, from which the generic name *Rangifer* arose. All caribou belong to the same genus and species, which means they share the same scientific name, *Rangifer tarandus*; but since five subspecies are currently recognized in Canada, a third word is added to denote their differences: *tarandus* (reindeer), *groenlandicus* (barren-ground), *caribou* (woodland), *pearyi* (Peary) and *granti* (Grant's).

With respect to common names, it is customary nowadays to use "caribou" when referring to the entire species or any of the North American subspecies, while "reindeer" is reserved for the European subspecies.

PHYSICAL APPEARANCE

Caribou are believed to have originated in Alaska, northeastern Asia, or the area in between. The earliest fossils were found in Europe and date back to 400,000 years ago. Caribou were present in North America during the last ice age (Wisconsin) and possibly the previous one (Illinoian) as well. Exposure to several hundred thousand years of glacial and interglacial climates has

produced a deer which thrives in regions of prolonged cold and snow. This is due to a remarkable combination of physical and behavioural adaptations which distinguish caribou from their relatives and equip them to succeed where the others cannot.

Caribou are medium-sized deer. Peary caribou being the smallest subspecies (adult bulls weigh up to 90 kg) and woodland caribou the largest (adult bulls weigh up to 270 kg). In contrast to most deer, a caribou's muzzle is thick and blunt. This is because it acts as a heat exchanger, warming inhaled air before it enters the lungs and chilling exhaled air to minimize heat and water loss during breathing. Caribou also have short ears, small tails, and compact bodies to reduce their overall surface area and thereby restrict the amount of heat radiating from it.

To further conserve heat, this animal is completely covered with hair including the densely furred ears and even the nose. Over most body parts there are two layers of hair — a fine crinkly undercoat and a thick overcoat of hollow kinky guard hairs which together trap an insulative layer of warm air around the animal. Although there is considerable variation according to subspecies and season, the basic colour pattern is dark on the back, face, and chest, while the neck, mane, rump, and belly are white or nearly so. The inside of the leg is light while the outside and front are darker with a white band above the hoof. Usually a dark stripe is found low along the flank. Among the subspecies, woodland caribou display the deepest browns while Peary caribou are the lightest, appearing almost white during winter. All subspecies are darker during the summer months after shedding their winter coats.

Caribou have typically slender "deer-type" legs with a special arrangement of veins and arteries that reduces the amount of heat lost by blood travelling to the extremities. The feet however are not deer-like, but much broader and more flexible to facilitate walking on snow and ice. In particular the middle toes bend up so the outside toes or "dew claws" can also carry weight on the snow. The hooves, as well, are large and crescent-shaped surrounding fleshy pads that shrink during winter and become covered with tufts of hair growing out between the toes. Thus in winter caribou walk on an insulative cushion of hair while gripping ice and hard snow with the protruding rims of their hooves. As for feeding in deep snow, such broad concave feet are ideal both for breaking through the crust and digging down to vegetation.

The combination of large flexible feet and extremely buoyant hair make caribou excellent swimmers capable of crossing wide stretches of open water and reaching maximum speeds of about 10 km per hour. On land caribou have a variety of gaits including a leisurely walk that can become a determined pace when migrating, a high-stepping trot when curious or alarmed, and an all-out ungainly gallop for extreme circumstances.

The most impressive physical feature of this species is the magnificent rack of antlers carried by mature bulls. But caribou are also unique among deer in that females are antlered as well. Complete antler development includes both "bez" and "brow" tines. Usually only one brow tine is present in a set of antlers but when two fan-shaped brow tines occur, hunters call it a "double shovel." Variation is such that no two antlers are ever the same even on the same animal. Females and young males produce smaller simpler racks than mature bulls.

Growing antlers are covered by "velvet," which is a special layer of skin covered by short fuzzy hair. Beneath the velvet is a network of blood vessels which deposit the minerals that are needed to build the antlers. Antler development is three to six months out of phase between the sexes. For example, in barren-ground caribou the male's antlers begin developing in March, grow rapidly from May to July, and are completely

In summer, lichens become less important as a food source.

hardened and out of velvet by mid-September. Following the rut, antlers are shed in early November by older males but may be kept until April by some of the younger ones. Female antlers develop from June to September and are out of velvet by late September. The antlers are retained throughout the winter, and are used to defend feeding craters in the snow from the larger but antlerless males. This provides a survival advantage not only for the female but also for her calf who shares such craters. Pregnant females drop their antlers within days of calving. Barren cows shed their antlers before the spring.

FOOD

For much of the year, caribou feed on plants which are dry and tough or woody. The first step in breaking down such material is "rumination" or cud-chewing which involves chewing, swallowing, regurgitating, and rechewing food. Further breakdown is accomplished by fermentation in a four-chambered stomach. First it is sloshed back and forth between the huge balloon-shaped *rumen* and the smaller honeycombed *reticulum*. Then it is passed on to the *omasum* which hunters call "the bible" due to the page-like folds of its lining. When the food has been thoroughly broken down and concentrated, it reaches the fourth chamber or *abomasum*.

There it is reconstituted with fluid containing hydrochloric acid to kill most of the fermentation micro-organisms. The resulting "soup" is then transferred to the intestines where nutrients and water are absorbed, and where eventually pellets are formed from the remainder.

During winter, caribou concentrate on energy-rich foods such as lichens, but they require other plants as well for some essential nutrients. They also have a special ability to compensate, at least partially, for dietary deficiencies by recycling nitrogen, resynthesizing and recycling glucose, and by storing and recycling many minerals such as calcium, phosphorous, sodium, and potassium. In addition they virtually stop growing in winter and also lower their basal

metabolic rate by 20-30% to reduce energy requirements for basic or "non-active" body functions.

Whenever possible, caribou accumulate fat as "safety deposits" for future periods of high energy demand. Bulls grow fat in late summer and early fall but expend it all during the rut. If winter range conditions are good, they will regain some fat which is usually used up during the spring migration. Females build up most of their fat in the fall and either store it or use it during the winter depending on range conditions. Any remaining fat after winter is utilized during the spring migration. Cows with little or no fat reserves in the fall do not breed and are thus spared the additional energy stresses of producing and rearing a calf. Newborn reindeer calves have a special type of heat-producing fat (known as "brown fat") that can be "turned on" in response to cold and may help them survive the critical first few days of life while such fat lasts.

PREDATORS

Apart from man, the major predator of most caribou herds is the wolf. Although wolves are quick to detect unfit animals and spend a lot of time "testing" bands of caribou to expose the weak or careless, the popular belief that they remove only the old and the sick is inaccurate. Wolves at times prey heavily on newborn calves of some herds and also capture many healthy animals. Similarly it is untrue that a caribou population needs wolf predation to maintain the health of the herd. Several populations such as the large Porcupine herd in the Yukon and smaller populations on Banks and Southampton Islands have few wolf predators but are not made up of inferior animals as a result.

Other caribou predators include grizzly bears, wolverines, lynx, and golden eagles. Of these, grizzly bears are significant predators of newborn calves on some calving grounds and golden eagles are also sometimes implicated in calf predation. The rest are mainly opportunistic predators, taking advantage of circumstances that permit them to overcome a prey that would normally escape.

PARASITES AND DISEASES

For caribou as for other wildlife, parasitism is the rule rather than the exception. Mosquitoes, blackflies, and bulldog flies plague the mainland herds in summer, reducing their feeding time by forcing them either to keep on the move or to seek refuge on snow patches. Extreme fly harassment may cause caribou to dash wildly back and forth across the tundra with such recklessness that sometimes animals are badly injured and occasionally die.

Other flies, like the warble and nostril flies, parasitize caribou throughout the winter. During summer, warble flies lay eggs in caribou hair and the larvae which hatch in about a week penetrate the hide and migrate to the animal's back. There they cut breathing holes through the skin and continue developing all winter in fibrous sacs beneath the hide. In spring they exit through the breathing hole and drop to the ground, where they pupate and a month later emerge as flies. Small oval scars on the hide show where the exit holes have healed over.

Nostril flies deposit larvae in the nostrils of caribou and these maggots crawl through the nasal passages until they reach the entrance to the throat where they remain all winter. In May, the fully grown larvae are coughed onto the ground where they spend two weeks to a month as pupae before emerging as flies. As many as 156 nostril fly larvae have been found in one caribou. In such concentrations they make breathing difficult for the caribou, especially when it has to run hard.

Caribou are also parasitized by several species of tapeworm which form larval cysts in the muscles or viscera of the animal. When eaten by wolves or other canines the larvae

Except for a few islands, wolves are found everywhere in the Northwest Territories.

become adult tapeworms in the intestines. As the tapeworms mature they release eggs with the faeces which contaminate vegetation and are eventually swallowed by caribou. The larvae then hatch and migrate to various parts of the body before forming cysts.

Caribou parasitized by thread lungworm harbour adult worms in the lungs which produce larvae that are sneezed or coughed onto vegetation where they remain until eaten by other caribou.

Cases of bacterial diseases including tuberculosis, actinomycosis (lumpy jaw), and brucellosis have been reported for caribou in the NWT, but such infections are relatively rare.

REPRODUCTION

Caribou rut in the fall and calve in the spring but the timing varies somewhat among the subspecies. Except for Mackenzie Delta reindeer which breed mainly in early September, rutting generally peaks progressively later from south to north, beginning with woodland caribou of the southern NWT in early October, barren-ground caribou in mid to late October, and Peary caribou in late October to early November.

Rutting behaviour is similar to other deer in that mature males are very active — rushing about, thrashing bushes with their antlers, sparring with other bulls and pursuing females. Unlike the other caribou subspecies which breed promiscuously, woodland caribou bulls defend harems of females to prevent other males from mating with them. Following the breeding peak, rutting behaviour rapidly tapers off in conjunction with antler-shedding by mature bulls. Younger males, which retain their antlers longer, may continue to spar occasionally throughout the winter.

Mackenzie Delta reindeer calve in April and May, while the other subspecies calve from May to June with peak periods being earliest for woodland caribou (mid to late May), followed by barren-ground caribou

Caribou seek remote locations to give birth to their calves.

(early June), and Peary caribou (early to late June). Each spring pregnant females return to particular areas in order to calve. In the Grant's and barren-ground subspecies, the "calving ground" is fairly well defined for most of the herd, although its annual size and location varies within a general region. Usually such areas are located either near the arctic coast or the shores of large inland lakes. There is some evidence that woodland females return to individually specific calving sites within the traditional summer range of the herd. In the Yukon, woodland caribou near the NWT border choose rugged inaccessible calving sites high up in the mountains. Probably woodland caribou in the adjacent Mackenzie Mountains of the NWT do the same. Calving grounds for Peary caribou are located near the sea coasts of their summer range; pregnant females disperse widely throughout these areas to calve and then regroup shortly after calving.

The gestation period for caribou is about 7 1/2 months. Usually calves have only a 20%-40% chance of surviving the first year but thereafter the odds are better than 80% of surviving each succeeding year. Adult caribou can live as long as 13 to 17 years, but few individuals ever reach such ages.

BEHAVIOUR

Of all the senses, caribou rely mainly on their keen sense of smell for survival. By scent alone they can locate food more than 70 cm beneath the snow under certain conditions. Caribou also depend mostly on scent to detect danger and will often circle downwind of unusual objects, such as humans, to identify them. So far, it

has not been determined whether caribou actually have relatively poor hearing and eyesight, or whether at times they just do not react to certain sights and sounds such as gunshots, motionless humans, engine noise, howling wolves, and so on. In any case both the senses of sight and hearing appear to be of relatively minor importance in the assessment of danger.

Although usually silent, caribou do vocalize at certain times. During the rut, bulls frequently pant and bellow, and for several months after calving, mothers and calves grunt back and forth to each other. Caribou often snort for a variety of reasons, but the most common sound associated with them is the clicking of their feet while walking — a noise produced by a tendon slipping over the sesamoid bone in the foot.

Caribou also communicate to each other with a variety of body postures such as head bobbing by a mother to attract her calf, head stretching to threaten a subordinate, and spreading the rear legs while urinating to indicate danger. When alarmed, caribou sometimes spring up on their hind legs and bound forward. During this "excitation jump," scent is deposited on the ground from a gland between the toes. This provides a temporary warning to other caribou crossing that spot.

Unlike other North American deer, caribou are remarkably curious and often bold enough to approach a strange object from which they seldom flee unless it has been verified, usually by scent, as dangerous. Thus hunters can sometimes entice animals within rifle range by performing odd postures and weird antics — tricks that only work when the performers are downwind. On the other hand, caribou may be wary of unusual linear structures, a trait that enabled native hunters to guide them with flimsy antler fences and Scandinavian herders to direct reindeer by means of dark cloth strips laid on the ground. In Alaska, some sections of elevated pipeline influence the distribution of caribou. Their reaction to winter roads, however, is ambivalent: sometimes they are reluctant to cross them, but at other times they use such roads for travel.

Caribou are gregarious, often travelling in small bands of particular composition such as cows and calves, or yearlings, or adult males. Periodically, much of the herd will gather into massive aggregations that number in the tens of thousands for the barren-ground and Grant's subspecies. About the only solitary activity is calving when females usually give birth alone, but soon after rejoin "nursery bands" comprised of other cows and calves.

Associated with gregariousness is the migratory behaviour for which caribou are renowned. All caribou are migratory, from the small woodland herds whose seasonal movements may cover a few hundred square kilometres, to the huge barren-ground herds with ranges larger than most European nations. The seasonal cycle of most animals in most herds is characterized by a spring migration toward the calving grounds, followed by a complex pattern of summer movements. These eventually blend into a fall migration towards the winter range where further movements occur until the ensuing spring.

The big question "Why do caribou migrate?" has no precise answer. However, it seems likely that by being almost continually on the move, caribou do not overgraze their range while taking advantage of the best affordable snow conditions and a wider variety of habitats. Migrations to remote calving areas may be a means of avoiding predators and certainly the unpredictable choices of migration routes and seasonal ranges leaves many predators (including man) waiting in the wrong place at the wrong time. In fact this survival tactic has bewildered generations of scientists and hunters whose frustrations are best described by the Chipewyan saying, "No one knows the ways of the wind and the caribou."

Bathurst caribou on the barrens.

HABITAT

BY DOUG HEARD AND PAUL GRAY

The word "habitat" is used to describe the area where an animal lives. There are many different kinds of habitat, each shaped by a variety of factors, including vegetation, climate, topography, and other wildlife. In Canada, caribou occur from the tundra of the high arctic islands to the southern limit of the boreal forest, and from the west coast's mountains and rain forests to the craggy fog-bound shores of the Atlantic Ocean.

In the NWT there are few places where caribou are not found. Their adaptability to diverse habitats is a major reason for their success as a species. Nevertheless, caribou cannot live everywhere. In particular they need places where food can be found through deep snow, where relief can be obtained from insects, and where predators can be avoided.

SNOW

The most pervading influence of climate in the NWT is the presence of snow, which for eight months of the year influences food availability and travel. In winter caribou must use their strong sense of smell to locate forage hidden beneath the snow. They can do this through snow depths of 15-18 cm and even deeper where shrubs protruding from the snowpack have formed air vents. To reach the vegetation underneath, caribou push soft and shallow snow with their noses, and dig craters with their sharp hooves as the depth and hardness increase. This is called "cratering."

Caribou have evolved to cope with most snow conditions, but sometimes extreme situations occur. Travel can be impeded, forage difficult

Bathurst caribou in the boreal forest.

to obtain, and vulnerability to wolves increased. On the high arctic islands, for example, warm days in spring and fall cause the snow to melt. Sometimes this meltwater percolates down through the snow and refreezes at ground level. When this happens, vegetation becomes completely inaccessible because caribou cannot paw through the ice. Conditions such as these were directly responsible for declines in Peary caribou numbers during the 1970s.

FOOD

Lichens are an important food for most caribou, especially in winter, but caribou are opportunistic feeders and will eat whatever plant species are available. In addition to lichens, barren-ground caribou wintering on the tundra feed on the branches of dwarf willow and birch, and on grasses and sedges which have retained green leaves. When wintering in the boreal forest, they feed primarily on lichens growing on the ground, but also eat lichens growing on trees, leaves of evergreen shrubs, and twigs of birch and willow. During summer months on the tundra, lichens become less important as a food source. Caribou take advantage of the new plant growth, including grasses, forbs, sedges, and the leaves and branches of dwarf willow and birch. In fall, they add fungi to their diet, and continue to feed on vascular plants as long as they remain available.

In summer Peary caribou are attracted to the protein-rich flowers of vascular plants like purple saxifrage and lousewort. On Banks Island, for example, Peary caribou do not consume large quantities of lichens. Instead, they concentrate on upland vascular plants during all seasons.

The summer diet of forest-dwelling woodland caribou in the NWT

Porcupine caribou in the Richardson Mountains.

has not been studied. It is likely that caribou concentrate on protein-rich vascular plants, such as grasses, sedges, willow catkins, larch needles, alder leaves, and sweet gale buds. In winter they likely move to upland sites where snow depths are less restrictive and vegetation more accessible.

CARRYING CAPACITY

An area of land can support only a limited number of animals. This is called its "carrying capacity." If the number of animals exceeds that level, the forage will be over-utilized, the physical condition of the animals will deteriorate, and the population will decline.

Though the food supply of caribou might at first appear unlimited because of the vast area of land, such is not the case. Due to a short growing season, land in the NWT is less productive than land farther south, and larger areas are required to support grazing animals such as caribou.

Since caribou are constantly on the move, feeding as they walk, the amount of damage sustained by plants is reduced, and the time needed for them to recover is lowered. If caribou grazed any area for an extensive period of time, the vegetation could be rendered unsuitable for decades. Lichens in particular grow very slowly.

The first estimate of carrying capacity was made by Seton in 1907, when he speculated that one million square miles of tundra could support more than 30 million caribou (or 30 caribou per square mile). Subsequent estimates based on scientific studies have provided more realistic information. The density of many herds today is between one and three caribou per square mile (0.4 to 1.2 caribou per square kilometre), but there is no single "correct" figure.

Muskoxen and caribou both occupy tundra on the mainland and on

Peary caribou on the high arctic islands.

the high arctic islands, and both have a similar diet. Competition between the two species may occur but has not been substantiated.

HABITAT USE AND POPULATION SIZE

Like all animals, caribou numbers increase and decrease over the years. As population size changes, the amount of range that the herd uses alters accordingly. When a herd is small, few barren-ground caribou migrate far into the boreal forest during the course of the winter; most winter on the tundra. As the herd increases, caribou expand their range and progressively more animals go farther south. These changes do not occur instantly but take place over the course of a few years.

From this, biologists conclude that much suitable winter range often goes unused. But for the great herds to continue to exist in the future, rarely frequented winter range must be available to them when they need it.

FIRE

Fire is a natural component of the boreal forest, and both plants and animals have evolved to cope with its effects. Summer fires can affect local caribou distribution for many subsequent years. Caribou tend to avoid recent burns where all plants have been killed because there is no food, and because fallen trees impede travel. Whether burns affect caribou distribution over larger areas by deflecting migrations is still uncertain.

The effect of fire on caribou numbers has long been a controversial issue. Some people believe that winter range is limited and that fire will further reduce the food supply, caus-

ing caribou to starve. These people want all fires put out. Other think that the amount of available winter range does not limit the growth of caribou populations and that fires will have no effect on numbers. According to this line of thought, fire may even be beneficial to caribou because lichen growth in young forests is more rapid than in very old stands. People who believe fires are neutral or beneficial do not want to see money spent suppressing fires. The situation remains controversial because there is at this time no way to demonstrate which view is correct, and neither view may be correct in all places at all times.

The effects of fire, however, are long lasting, and conclusions must be based on those long-term effects. Caribou begin to use burnt areas after about 15 years, but preferred lichen species are not abundant until 30-50 years later. Conclusions regarding the effects of fire are further complicated by the fact that not all fires exert the same impact on the environment. A large, intense, and severe burn can destroy all plants, but less intense burns may result in a mosaic of unburnt areas within the perimeter of the burn. Those areas serve as caribou habitat and allow caribou to move through to unburnt range.

OTHER ANIMALS

In addition to forage and snow conditions, habitat selection is based on other environmental factors, such as the presence or absence of insects, predators, or other caribou. For example, to reduce harassment from mosquitoes and flies, caribou seek windy ridges, remnant snowfields, and cool shady forests. It may also be a reason for the formation of dense groups in summer: by packing closely together they reduce the amount of exposed body area.

The threat of wolf predation influences where caribou calve, where they feed, and where they rest. Wolves move with the caribou throughout most of the year, but in the summer adults must stay close to dens to look after their pups. Caribou are thus able to reduce the number of wolves associated with their herd by calving far from those areas where wolves den. Willow thickets along tundra rivers and streams are often avoided by caribou because they may conceal wolves. Caribou also prefer to feed in the open so that predators can be more easily detected. Caribou wintering in the boreal forest rest on frozen lakes for the same reason.

The presence of caribou affects the habitat of other caribou. Cows draw together on a traditional calving ground, further reducing the chance of predation on their calves by sharing the risk with thousands of others. Bulls usually avoid wintering in areas occupied by cows and their relatively vulnerable calves because wolves may spend more time hunting in those areas, and because bulls may be driven away from feeding craters by cows.

CONCLUSION

Caribou are adaptable. They can live in association with wolves and warble flies, mosquitoes and muskoxen. They can live in association with hunters and roads and pipelines. As long as they have space, they can survive — space to search for the best food where snow conditions are the least restrictive, space to find areas offering relief from insects, and probably most important of all, space to avoid wolves and other predators.

Because caribou need so much space, caribou habitat is often unoccupied, but as George Calef says so eloquently in *Caribou and the Barren-Lands*:

> To follow the caribou is to experience every facet of the northern environment, for the caribou are the central creatures of the North, the pulse of life in the land. They quicken the country not merely by adding animation and excitement themselves, but also by carrying along a host of other creatures: the wolf, the fox, the raven. The empty tundra may appear a drab and barren place, but let one caribou trot onto the skyline of an esker and the land comes alive.

In 1987 there were an estimated 1.5 million caribou in the Northwest Territories.

RESEARCH

BY DOUG HEARD

In order to make wise decisions about caribou, people must know as much about them as possible. The gathering of this information is called research. It may focus on physical aspects common to all caribou (their size, food, reproductive ability, diseases, and so on), or it may involve their performance as a group or population. Most research conducted by the NWT Department of Renewable Resources is of the latter kind. It has very specific objectives.

First and foremost, all populations must be clearly identified. This is done by defining the areas which they use. After this information is obtained, the status of each herd can be learned. Are numbers stable, or are they going up or down? Since population size is never static (each year, new animals are born and others die), obtaining this information is an on-going process.

If numbers are changing, the cause must be determined. Specifically, we need to know the present size and any changes over the years in:

- the number of calves born
- the number of calves that survive to become adults
- the number of caribou killed by wolves, and
- the number of caribou shot by hunters

The most important and, therefore, the most commonly used research methods are dealt with below.

MARKING

Marking refers to any method which is used to identify an individual animal. Since caribou often travel great distances, marking is the only way to connect summering and wintering areas. Marking has played a significant role in identifying caribou herds on the mainland and on Baffin Island.

Until 1984 in the NWT, marking usually meant ear-tagging. This is done

in summer when caribou are swimming lakes or rivers along a traditional migration route. The technique is fast and simple. The tagging crew waits until the caribou have entered the water and are far enough from shore to be intercepted by boat. The driver pulls up beside an animal and someone uses a special pole (or shepherd's crook) to hook the caribou around the neck and guide it to the side of the boat. As it is held there, the ear tag is attached. The only tags presently being used in the NWT are made of rubber. They are attached with a special instrument, resembling either a knife or a pair of pliers, which in one motion cuts the ear and slips one end of the tag through the cut.

While the animal is being tagged, other useful information is obtained. The caribou's sex is determined and, if it is a female, whether or not it produced a calf in the spring (determined by the presence or absence of an udder). The sex and reproductive condition is recorded in a book, along with the tag number, date, and location of the tagging site. The animal is then released. The entire operation can take as little as one minute per caribou.

Hunters return the tag to the nearest Renewable Resource Officer whenever they shoot a tagged caribou. The Renewable Resource Officer records the date and location where the caribou was shot. In this way, after hundreds of tags have been returned, the migration routes and limits of the range used by each population can be determined. Since the return of tags is essential, hunters are usually paid a cash reward. On Baffin Island, they receive $10 for each tag returned.

Another marking method is collaring. The principle and execution are the same, the only difference being the use of a plastic collar which is fastened around the neck of the caribou.

A completely different technique is radio-collaring. Caribou are captured on land using a net which is propelled over them from a helicopter. The animals are restrained by hand while the net is removed. A collar containing a radio transmitter is fastened around the neck of each one. The movements of the caribou can then be tracked precisely by aircraft. Since 1984, nearly 200 caribou have been fitted with radio collars in the Keewatin and Inuvik regions. In 1987, this technique was refined even further, when 15 caribou in the Baffin and Kitikmeot regions were fitted with collars containing radios which transmit signals to a satellite. The satellite determines the location of each caribou every five days.

Radio-collaring is more expensive than tagging, but it provides more information and relatively few animals need be captured and handled. Tagging usually provides only two locations: the point of tagging and the kill site. Monitoring radio-collared caribou fills in the path between the collaring point and the point where the caribou is killed. Radios may function as long as four years before the batteries wear out.

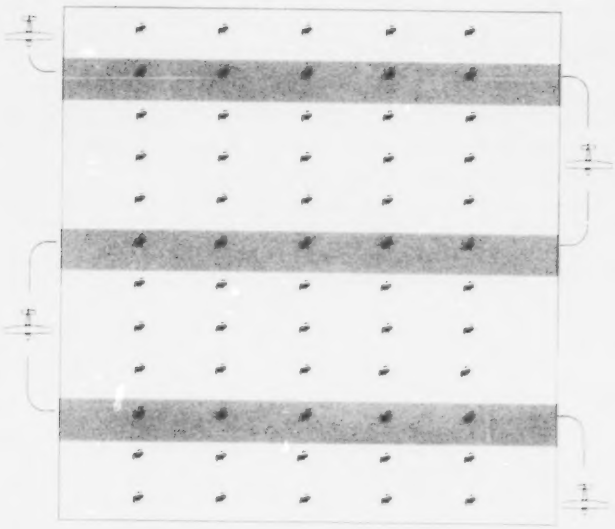
CALVING GROUND SURVEYS

Once the range of a particular caribou population is determined, an attempt to estimate its size can be made. The task is formidable. Even with the use of aircraft, it is impossible to cover all of a herd's occupied range quickly enough to obtain a total count. For one thing, caribou won't stand still while they're being counted. This means the longer a survey takes, the more inaccurate it is likely to be — either as a result of missing groups of caribou completely, or counting them more than once.

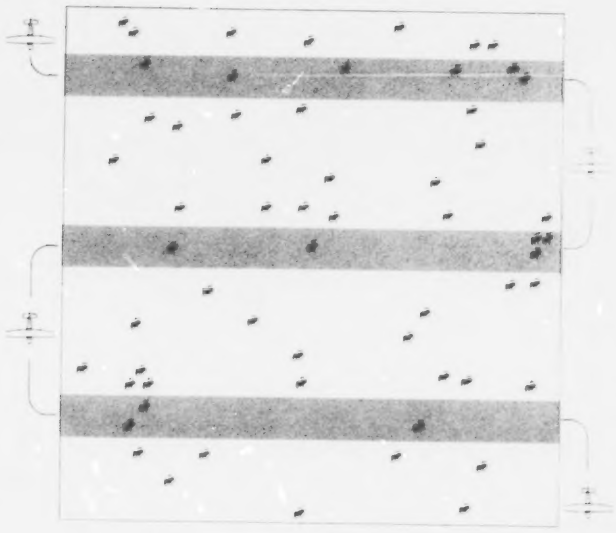
Fortunately for management purposes, it is not necessary to know the exact size of a population. A reasonable estimate is sufficient. If a series of estimates is available, all acquired using the same methods and based on the same assumptions, then the trend of the herd can be established (i.e. stable, declining or increasing).

Aerial surveys of caribou are most often done in June, during the

SAMPLING CARIBOU

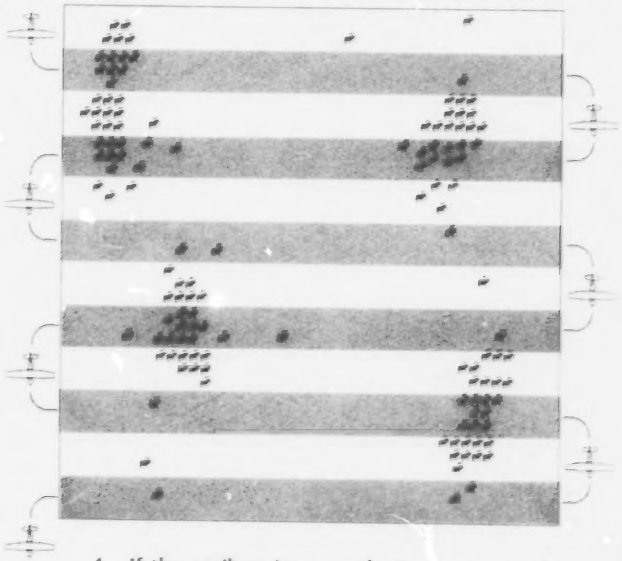


1. If all caribou were evenly spaced, an estimate of their numbers would be very accurate. Here, coverage has been 25% and 15 caribou have been counted. The estimate is then 4 x 15 = 60, which is exactly the number of caribou in the area.



2. Although caribou are never spaced evenly over an area as in example 1, their density can be fairly uniform. Here, 14 caribou were counted at 25% coverage. The estimate is 4 x 14 = 56. The actual number of caribou is 60.

3. Sampling becomes more difficult when caribou form many dense groups. When this happens, coverage must be increased or estimates may be inaccurate. In this example, coverage of 25% gives a count of 22 with an estimate of 4 x 22 = 88. This is far from the actual total of 133.



4. If the caribou in example 3 are surveyed at 50% coverage, a more accurate estimate is obtained (2 x 59 caribou counted = 118 estimated). In real-life situations, however, coverage rarely goes as high as 50%. In some places it may be 10%, in other places 25%. Determining the amount of coverage is a crucial decision.

week or two that all cows are found together in the greatest density — on the calving ground. Even then, it is not possible to count all, so a sample is taken (i.e. only a portion of the calving ground is surveyed). For example, if the calving ground were a square, it could be divided into four equal parts, and only one part surveyed. The population of the entire calving ground could then be estimated by multiplying by four the number of caribou found in the part surveyed. The obvious criticism of this technique is that the number of caribou in the other parts may be quite different from the part surveyed.

To minimize pitfalls such as this, many small areas scattered throughout the entire calving ground are usually

Caribou are photographed from the air and then counted.

sampled, rather than one large area.

A calving ground survey begins with aerial reconnaissance to define the boundaries of the calving ground. Then flight lines are flown over the entire calving ground. The distance between flight lines determines the amount of coverage.

Two observers, one on each side of the aircraft, are used. Each observer counts all the caribou he sees within a 400-metre strip on his side of the plane. The window and the wingstrut are marked in such a way as to enable the observer to visualize the 400-metre strip on the ground. To do this, the plane must fly at a fixed altitude.

There are many aspects of this procedure that are susceptible to

Studies have shown that many calves do not survive their first winter.

human error. If an observer moves his head slightly, or the airplane changes altitude, the width of the transect strip on the ground will not be correctly estimated, and the observer will count either more or less caribou than he should. Ability to see caribou, and resistance to fatigue, vary with each observer. Sitting in cramped quarters for five hours a day, four or five days in a row, listening to the drone of the airplane while trying to distinguish caribou against a difficult backdrop, can cause considerable eyestrain and general fatigue. Another problem is that observers have only a few seconds in which to count any caribou within the imaginary strip. Sometimes, groups are too large to be counted and must be estimated. All of these factors can result in observer error. Since observers generally underestimate caribou numbers, counts from these surveys are increased by 25%.

An attempt to reduce these problems began in 1980 when aerial photography was employed on calving ground surveys. Photo-interpreters can then take as much time as they need to make their counts, and can take breaks whenever they need them. Actually picking out the caribou on the photos, though, is not as easy as it sounds. In some cases, there was a difference of as much as 30% between photo-interpreters.

Nevertheless, it is now generally accepted that aerial photography is more accurate than visual counts. In some cases, aerial photography gave results which doubled population estimates based on visual surveys.

Visual surveys of calving grounds on the mainland still continue to be flown, but as of 1982, always in conjunction with photographic surveys.

FALL COMPOSITION COUNTS

The size of a herd cannot be estimated on the basis of a calving ground survey alone. This is because not all caribou are found on the calving ground: most bulls are found elsewhere at the time. However, by determining the sex ratio, a total population estimate can be obtained from the calving ground estimate.

The sex ratio is usually obtained in the fall when caribou of all ages and both sexes are most completely intermingled. Biologists fly by helicopter to caribou concentrations. They approach the caribou on foot and observe them with the aid of binoculars or a telescope from up to 400 metres away.

Sex recognition is based on several criteria. Males are distinguished from females by the presence of a penis. If the penis cannot be seen, then the only sure way to identify the sex is by looking under the tail. Females have a dark spot below the anus (the vulva) and males do not.

Sex cannot be determined from antler size or shape in all cases. Younger males have antlers that are not always distinguishable from those of a female.

TOTAL POPULATION ESTIMATE

By combining data obtained from calving ground surveys and composition counts, the following formula is used to generate a total population estimate:

$$\frac{\text{number of caribou on the calving ground}}{\text{proportion of breeding females in the total population}} \times \frac{\text{proportion of animals on the calving ground that are breeding females}}{\text{proportion of females in the total population (sex ratio)}}$$

Calves are excluded from these calculations as their mortality rate varies from year to year and may be quite high. Therefore, most population estimates are actually for all caribou over one year of age.

Because total population figures are always estimates, and because there are always variables or assumptions involved, the estimates are never stated exactly but given as a range of values. An estimate, for example, may appear as 100,000 ± 20,000, or 80,000 - 120,000. The narrower the range, the more reliable the estimate is.

BIRTH RATE ESTIMATES

Biologists estimate the proportion of female caribou that will give birth to a calf in June by examining some females in winter to see if they are pregnant. In late winter and early spring, biologists accompany hunters or ask hunters to bring in the required specimens. For each female shot, the uterus is examined for the presence of a fetus or collected for later examination. In addition, the jaw from each female is collected for later determination of the caribou's age. Care must be taken to keep the information on the reproductive condition with the appropriate jaw. In the laboratory, the jaw is examined for tooth development and the amount of wear. A tooth is extracted and, after a few days in acid, it can be cut into very thin sections with a special machine. The sections are put into a stain that colours some parts of the tooth darker than others. Examination of the tooth section under a microscope will reveal a pattern of dark and light lines. The number of lines corresponds to the age of the caribou.

The biologist uses this information to estimate the health of the herd. In a very healthy population, almost all of the animals over two years old will be pregnant. In normal populations, only half of the two-year-olds are pregnant and most of those over three years old, but in very bad years, almost no females will be pregnant, regardless of age.

RECRUITMENT COUNTS

Recruitment refers to the number of calves entering a population. However, since mortality can be very high during the first winter, calves are not counted as part of the population until they are nearly one year old. In late March and April, biologists view thousands of animals to determine the proportion of calves which have survived the winter. Their rate of survival equals herd recruitment for that year.

HUNTER KILL SURVEYS

Biologists would like to know the number of caribou shot each month and their age and sex. Methods vary in detail but all depend on the hunter to record or remember the number of caribou he or she shot. Non-native hunters are mailed questionnaires to fill out and return each year. In some regions, native hunters are given specially prepared calendars to assist them in noting their kills, and are interviewed by field workers who tabulate the results monthly for each community. These surveys are conducted by native organizations in the Baffin, Keewatin, and Kitikmeot regions, and in part of the Inuvik region.

In the past, people depended on wildlife for survival. Now wildlife need people to survive.

MANAGEMENT

BY ED HALL AND KEVIN LLOYD

The concept of wildlife management rests on the premise that wildlife needs some form of protection or stewardship to survive in today's world. In the past this was not the case because mankind lacked the means to seriously alter the abundance of wildlife and the environment that it depends on. Now, with the explosive growth in human numbers and technology, mankind has the power to wipe out entire species — and has already done so. The single most important factor in the future of wildlife is the ability of people to foresee the consequences of their own actions and to plan accordingly. This act of planning and self-restraint is called wildlife management.

In the NWT, caribou management includes licencing, setting seasons and quotas, restricting certain kinds of hunting equipment and certain uses of caribou, allocating harvest to the various users, and protecting habitat. Biologists conduct extensive studies to ensure that decisions regarding these matters are as informed as possible. The public's compliance is ensured through conservation education as well as legislation.

In the NWT, the Department of Renewable Resources is responsible for gathering information about caribou and other wildlife, and for recommending ways of ensuring the survival of caribou in large enough numbers to be of benefit to northerners and the rest of the world. Where such recommendations take the form of laws, two kinds of legislation are involved: the Wildlife Act and the Wildlife Regulations. The former outlines the broad rules which govern the use of wildlife in the NWT, and which are considered basic enough that no change to them is anticipated in the near future.

There are some laws, however, which are subject to frequent or periodic change — for example, licence fees, quotas, seasons, hunting

zone boundaries, and so on. The Wildlife Act approves these concepts in principle and relegates their specific expression to the Wildlife Regulations, which for the sake of convenience may be altered by the Minister of Renewable Resources and signed into law by the Commissioner. Changes to the Act, on the other hand, may be made only at a full sitting of the Legislative Assembly. In this way the electorate is tied to the decision-making process — through its elected representatives, and in particular through the Minister of the Department.

This centralized, democratic approach to wildlife management is typical throughout Canada and the United States. The need for such an approach is best exemplified by a migratory species like caribou, which move great distances and ignore political boundaries. The experience of no single community or area can tell the whole story of a caribou population. It is the government's job to put all the pieces together to form an overall picture, then to advise the communities and act accordingly. It is the right of the electorate to direct the government on broad wildlife issues, and its duty to abide by the will of the majority.

The goals of caribou management in the NWT are:

- to safeguard caribou herds so that traditional users can maintain their option of a lifestyle which includes the use of caribou.
- to safeguard caribou herds in the interest of NWT residents and all Canadians, as well as people of other nations.

CONSULTATION

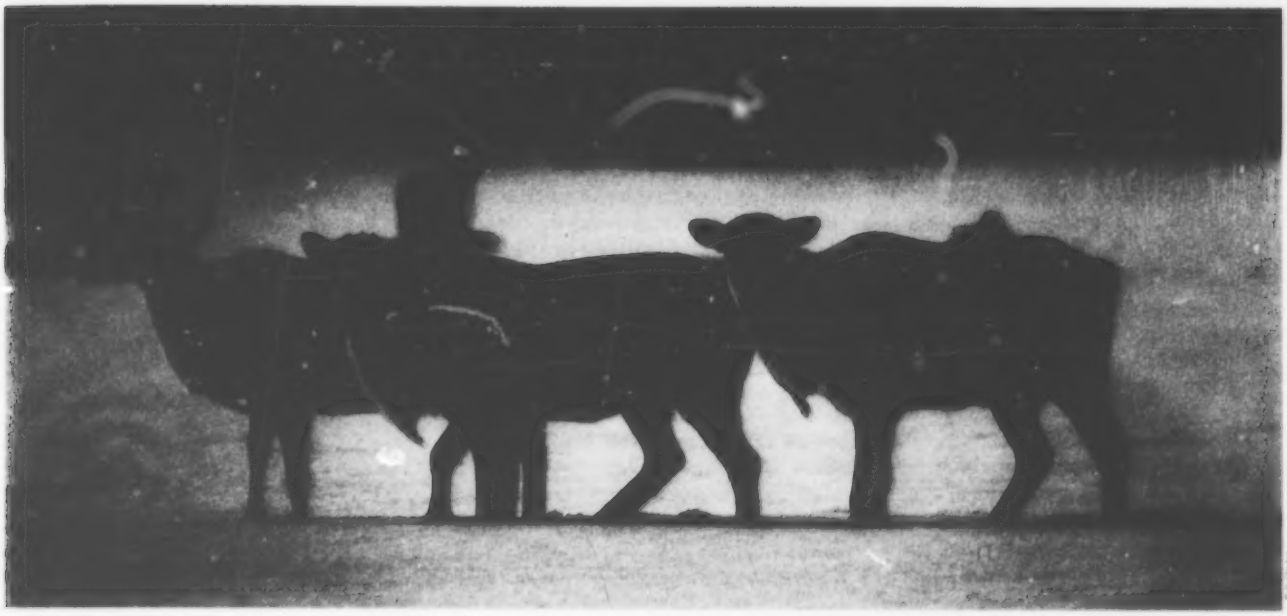
Communication with the public is an essential part of wildlife management, for without public support, programs will meet with limited success. The more that people understand the basis for wildlife policies, programs, and regulations, the more likely it is they will be committed to them. In the NWT, the communication challenge is compounded by the diversity of languages in use. Although English is the most widespread, it is not the mother tongue of a majority of people here. The largest ethnic group is the Inuit, but their language has many dialects and uses two different sets of symbols — Roman script in the west and syllabics in the east. There are also five Dene languages: North Slavey, South Slavey, Dogrib, Chipewyan, and Loucheux.

The other main obstacle to communication is the isolation of communities. One of the most sparsely populated areas in the world, the NWT spans a vast area, taking up more than one-third of all Canada. Transportation is generally costly and restricted (in many places to only small air carriers), and although most settlements receive radio and television broadcasts, local access to these media is limited.

To ensure that channels of communication exist, the Department of Renewable Resources has helped organize Hunters and Trappers Associations in nearly all communities. These organizations receive financial support annually, are consulted on a regular basis, and routinely approached whenever a research permit is needed to conduct scientific studies of wildlife, even when the researcher is the Department itself. Their recommendations are taken very seriously: for example, the marking of caribou was suspended on the mainland for many years as a result of local opposition.

Involving native people in wildlife issues and obtaining their support for managing wildlife on a scientific basis is essential because native people form a majority of the population in the NWT, and because wildlife is vital to their culture and economy.

Yet for many native people, consultation did not go far enough. Local people wanted to play a more direct role in managing wildlife. An important step toward accommodating this desire was taken in 1982 with the formation of the Beverly and Kaminuriak Caribou Management Board. It replaced an earlier group composed en-



Three mature bulls in March.

tirely of government representatives. Native users from communities on the ranges of the two herds now form a majority. Decisions on the management of these herds and their habitat are not made without consulting the board. This approach has been so successful that similar boards have been formed in other areas. The result is that decisions on the management of *any* NWT caribou and their habitat are not made without consulting at least one of these boards. This process ensures the involvement of user groups by providing a public forum for debate over any proposed change.

MANAGEMENT OPTIONS

Research and public consultation are necessary prerequisites to management, but by themselves, they do not constitute it. Management consists of activities which are designed to affect caribou, their environment, or people. Management may be considered under a number of general headings:

a) Actions which reduce mortality

The major causes of caribou mortality are hunting, wolf predation, and inclement weather at critical periods. Other forms of mortality, such as disease and accidents (e.g. drowning), are not usually considered significant.

Wolf control programs have been tried, and included bounty payments of $30 per pelt during a 13-year period (1924-33 and 1937-39), and a poisoning program on caribou ranges east of Great Bear Lake from 1951 to 1964. The NWT no longer considers poisoning an option.

Hunting of caribou can be limited in a number of ways, including the imposition of seasons, quotas and licencing. However, native people are assured access to caribou and other game for food by provisions of the NWT Act. Limitations to this access could be applied if the caribou populations were in serious decline and in danger of becoming extinct. Since the caribou herds are healthy and trends remain positive, no restriction on harvest levels currently apply to native harvesting for food. Limited commercial harvesting by General Hunting Licence holders for the purpose of meat sales is provided for through quotas on some herds.

Non-native hunters are restricted by seasons, quotas, and licencing requirements. For the purpose of hunt-

ing residency status is earned only after living in the NWT for two years (the longest such requirement anywhere in Canada). Limits for residents have been adjusted several times in recent years. In the 1970s it was five caribou per hunter, then it dropped to three, and now is back at five. These may be any age or sex. Non-residents must obtain the services of a licenced outfitter, and may hunt males only. Both groups are allowed one woodland caribou and one arctic island caribou of any age or sex per year. Non-residents are subject to shorter seasons and allowed to hunt in fewer areas than residents.

There are also a number of general prohibitions which apply to all hunters. These include restrictions on weapons and vehicles, and are meant to buffer caribou from the killing power of modern technology. For example, the use of aircraft is restricted (but not snowmobiles) and automatic weapons are not allowed.

Other regulations are meant to ensure that needless mortality does not occur; for example, hunters must make every effort to retrieve a wounded animal, and below the treeline calibres smaller than .24 cannot be used. Metal-jacketed or military ammunition is not permitted since bullets would have a greater tendency to pass completely through an animal, allowing a higher rate of escape and prolonged suffering for those whose wounds were not immediately fatal.

b) Actions which govern the use of caribou.

A variety of laws are in effect. They include prohibitions against wastage of caribou meat, using it for bait, or feeding it to dogs in settlements. The sale of caribou is strictly controlled by quotas, which are established only when caribou herds are healthy and domestic needs have been satisfied.

Limits are in place on the amount of caribou meat which a native can give to a non-native (10 kg every 60 days). There is also a limit to the amount of caribou meat which can be exported from the NWT.

c) Actions which reduce indirect impacts on caribou.

One often-mentioned action is fire suppression on caribou ranges. Currently, only fires within certain areas (near communities or along transportation corridors) are fought. Factors of cost aside, it has not yet been determined conclusively whether reducing fires would actually have a beneficial effect on caribou range in the long term.

Environmental planning can play an important role here. The development of the north's vast mineral and hydrocarbon holdings should not occur at the expense of caribou and other wildlife. Land Use Plans will ensure the orderly development of renewable and non-renewable resources.

Caribou Protection Measures for the Beverly and Kaminuriak herds are invoked at critical locations, such as calving areas and water crossings, to protect caribou from disruption by mining exploration activities at certain times. The Measures are specific to the Beverly and Kaminuriak herds due to the amount of mineral exploration which occurs on their range. Even though exploration and development may not be detrimental to caribou, these restrictions ensure that no harm will be done.

Throughout the NWT caribou are protected by a general injunction which prohibits people from harassing them, unless in the act of hunting. For example, pointless chasing of caribou by snowmobiles may leave the animals in a weakened condition and susceptible to other mortality factors.

d) Actions which restore or provide aid to caribou populations.

Caribou were reintroduced on Southampton Island in 1967 after they were exterminated by overhunting in the early 1950s. This is the only instance of a caribou transplant in the NWT. Four reindeer transplants have been attempted: Fort Smith (1911), Baffin Island (1921), Mackenzie Delta (1935), and Belcher Islands (1978).

The first two quickly failed, the third was successful after decades of effort, and the last is off to a good start.

Transplants are expensive projects and cannot be undertaken lightly. In addition to the obvious logistical problems, work must be done to ensure that range conditions are adequate to support the new population. If the area is one from which a previous population was extirpated, there must be some assurance that the decimating factors are no longer in effect.

In addition to transplants, there are projects which involve habitat improvement and feeding of wildlife. Both have been carried out for other species in the south, but none has been attempted for NWT caribou.

ALLOCATION

Wildlife in the NWT is considered a resource, which means it is used by people for various purposes. The uses of caribou fall into the following general categories:

- domestic use (traditional users, resident hunters)
- intersettlement trade (traditional users)
- guiding and outfitting (for non-resident hunters)
- commercial use (both inside and outside the NWT)

As well, the significant interest in caribou by resident and non-resident naturalists continues to grow. In the years to come it may be necessary to separate this interest from others by using more refined management zones and seasons.

The critical question is how caribou will be shared so that all of these needs can be met. This issue has been partially addressed by the various land claims agreements, which make it crystal clear that the domestic needs of traditional users have top priority. The relative priority of other users has not been discussed in a comprehensive way.

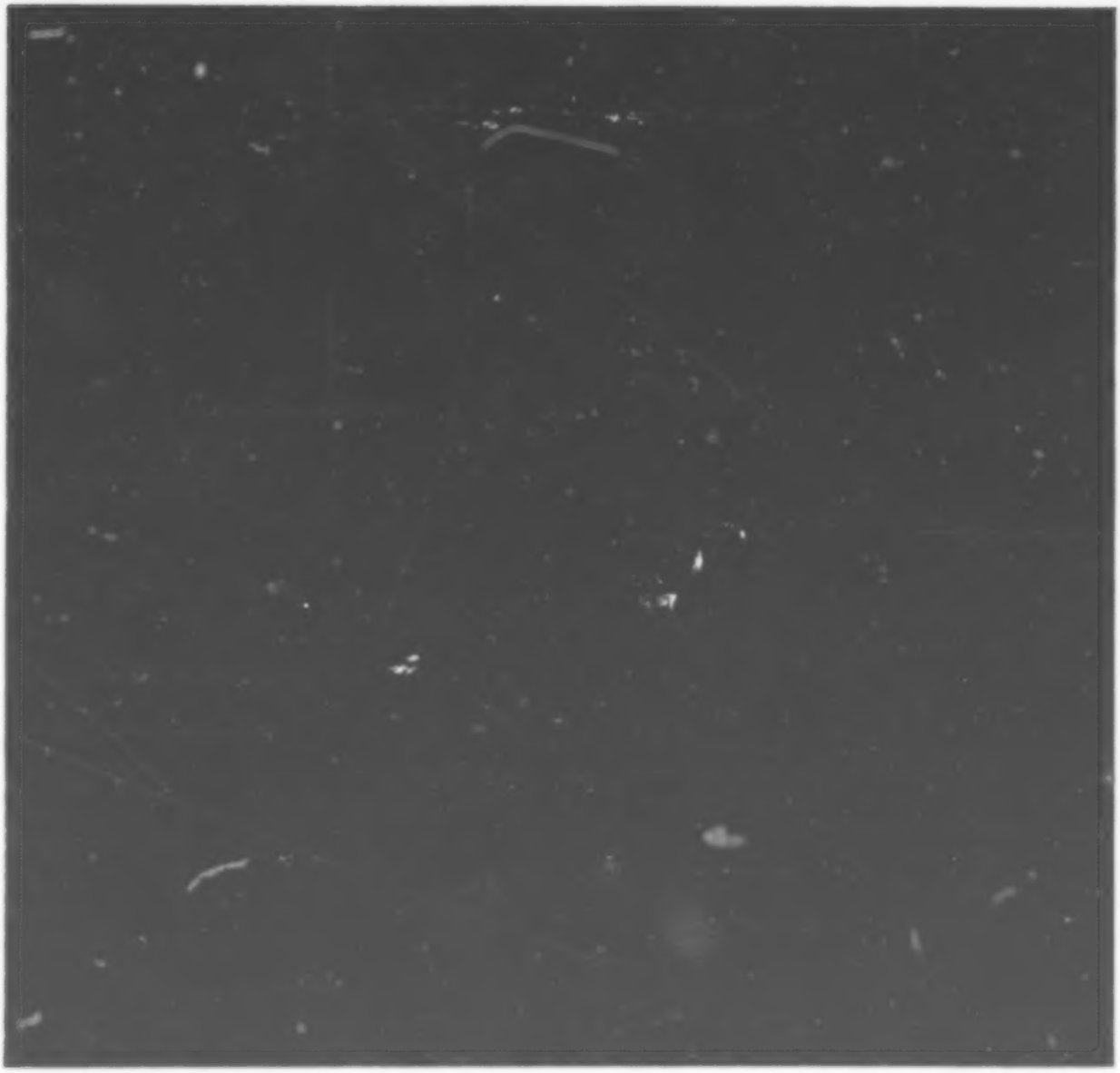
As time goes on, allocation policies will of course be strongly influenced by public consultation as well as by the new resource management boards being established through the claims process.

EDUCATION

It is commonly said that education and enforcement go hand-in-hand. Obviously people will be less likely to obey laws which they don't understand, but because of the cultural and linguistic differences in the NWT, wildlife managers must make a special effort to ensure that people understand laws and the reasons behind them. A more pragmatic reason is that enforcement is costly and difficult in the vast, sparsely populated north. Consultation and education therefore must be an ongoing process — not only preceding, supporting, and following specific management actions, but also including a comprehensive program of educating people not familiar with concepts such as wildlife conservation and the scientific study of wildlife.

To this end, the Department of Renewable Resources has produced a variety of educational items related to caribou, including several recent pamphlets and films. The Beverly and Kaminuriak Caribou Management Board has released an extensive school program composed of four boxed units, and publishes a glossy newspaper called *Caribou News* six times a year.

When speaking about education, it is important to remember that people outside the NWT must be educated as well. Caribou, or any other wildlife species, cannot be managed in isolation from people elsewhere in the country or the world. These people too have a deep interest in wildlife and have the means to make their concerns felt — as evidenced by the drastic impact on Inuit communities caused by the European boycott of sealskins. It is critical that people outside the NWT understand and respect the importance of caribou to northern lifestyles. The continued health of NWT caribou populations is the best way to accomplish this.



Fresh caribou trails on the tundra.

HISTORY OF RESEARCH

BY DOUG URQUHART

In the NWT, caribou research began thousands of years ago when the first hunters began to pursue this precious source of food, clothing, and shelter.

Theirs was the science of survival.

Through generations of experience, these hunters developed an intimate knowledge of the caribou's behaviour and seasonal movements and, like all experts, bridged knowledge gaps with theories and speculations — later called myths and superstitions. But unlike modern day research, the stakes were higher. When this prehistoric science failed, people starved, people died.

By the time Europeans arrived, native people already possessed an impressive oral legacy of caribou information. This they shared with the newcomers, who over centuries gradually incorporated it into their own caribou library. The process continues to this day as biologists and local people work closely together on caribou studies, each contributing their special brand of knowledge and expertise to the projects.

EARLY EXPLORERS

Perhaps the earliest historical reference to caribou in the NWT is an account of Martin Frobisher's expedition to Baffin Island in 1576 which commented that, "Having entered three-score Leagues, he went on shore, and was encountered with mighty Deer, which ran at him, with danger of his life." The image of terrified seamen fleeing from a curious band of caribou typifies the 16th century attitude to new world "beasts," which often appeared in grotesque illustrations and were credited with fantastical behaviour.

In the century following Frobisher's visit, only a dozen expeditions reached the NWT until 1670 when the Hudson's Bay Company

became incorporated. Prior to the arrival of the "gentlemen traders" virtually nothing of consequence concerning caribou was recorded, but after the company became established, all manner of wildlife specimens were shipped back to the Royal Society in London and various museums in Europe. Taxonomists had a field day with this material, cranking out hosts of new species and squabbling among themselves over their classifications. At one point caribou were thought to be a kind of goat.

Throughout the 1700s the Hudson's Bay Company remained instrumental in the traffic of wildlife specimens and in observations made by some of its employees. Samuel Hearne among them. In the narrative of his journeys toward the Coppermine River between 1769 and 1772, Hearne combined his own observations with native lore to detail the life history, behaviour, seasonal movements, and human use of barren-ground caribou. Although this was the best account of caribou in the 18th century, it incorporated some common misconceptions: that caribou migrated east and west rather than north and south, and that the sexes remained completely separate at all seasons except during the rut. He did, however, take great pains to dispel the popular notion that male caribou shed their penises each year after breeding.

Despite Hearne's efforts, and more than two centuries of European contact, caribou in the NWT remained slightly known and much misunderstood by the scientific world. The only factor which could alter this status was exploration and it came in a great wave of 19th century expeditions crisscrossing the NWT in search of the Northwest Passage and sometimes of each other. Many parties were attended by a "surgeon" whose duties often included the collection of flora and fauna. Such a man was Sir John Richardson, who accompanied the first two Franklin expeditions in the early 1800s and also commented on the collections made by Parry, Back, Belcher, and Kellet. In 1829 he published Part One of the *Fauna Boreali-Americana* which introduced barren-ground caribou as *Rangifer arcticus* and became the standard work on caribou life history for the remainder of the 19th century.

Towards the end of the 1800s some impression of caribou distribution, life history, and human utilization in much of the NWT could be gathered from accumulated exploration, scientific, and fur trading reports. By then a distinction had been made between a large race of caribou which lived in the woods and a smaller race which inhabited the barren grounds.

No one, however, had seriously attempted to estimate caribou numbers, believing as did the Canadian explorer and geologist, J. W. Tyrrell, that, "They could only be reckoned in acres or square miles." But at the same time there was some concern for the welfare of the species, due to the apparently enormous toll taken by whalers, fur traders, and native people with firearms. Such misgivings foreshadowed the 20th century preoccupation with caribou numbers and population trends.

THE TWENTIETH CENTURY

By the turn of the century, the United States had become active in arctic exploration, beginning with several searches for Sir John Franklin and progressing to the six voyages of Robert Peary ending in 1909 when he reached the north pole. In 1902 the American taxonomist J. A. Allen described a small caribou from Ellesmere Island based on a series of specimens sent to him by Commander Peary. He called this new species *Rangifer pearyi*. In the same year he also described a species from the Alaska Peninsula based on collections obtained by the U.S. Biological Survey Division. This he named *Rangifer granti*, presumably after M. Grant, a colleague in the New York Zoological Society. Both of Allen's "species" are presently accorded subspecific status and are known today as Peary caribou

Caribou are excellent swimmers.

and Grant's caribou.

Surprisingly, the new Alaskan collection exposed the lack of existing material for the Hudson Bay region. This was due to the gradual disappearance over the preceding century of the original specimens contributed to museums by the Hudson's Bay Company. In order to obtain fresh material for comparison with the Alaskan data, the U.S. Biological Survey sent E. A. Preble on two expeditions to the NWT, one to the Hudson Bay region and the second to the Athabaska-Mackenzie region. The reports of his investigations published in 1902 and 1908 provided a new starting point for caribou biology in the NWT. Preble was the first to suggest that caribou are grouped into "... different herds, or aggregations of herds, which never associate with each other at any time of the year and which have somewhat different habits." Succeeding biologists diligently pursued this concept but the accurate identification of herds was to elude them for another 50 years.

Accompanying Preble on his second journey was Ernest Thompson Seton, who was the first person to assign a figure to the barren-ground caribou population. In *The Arctic Prairies*, which chronicled his travels to Aylmer and Clinton-Colden Lakes in 1907, he reasoned: "A year afterward, as I travelled in the fair state of Illinois, famous for its cattle, I was struck by the idea that one sees far more caribou in the north than cattle in Illinois." Armed with this insight he calculated that since Illinois contained 3,000,000 cattle on 56,000 square miles, the "Arctic Plains" which covered 1,000,000 square miles must support more than 30,000,000 caribou.

However crude Seton's estimate was, it marked the turning point from the centuries-old perception of caribou as limitless and innumerable to one of a finite and therefore quantifiable population. For decades thereafter Seton's 30,000,000 caribou, "with the wind blowing through their whiskers," were faithfully passed on from one writer to the next, accumulating credibility as they went — much to the consternation of succeeding biologists whose more reasonable estimates

were overshadowed by this venerable figure. Seton in fact opened the Pandora's box of caribou calculations which henceforth proceeded to monopolize research efforts in the NWT.

DECLINING NUMBERS

Along with the concepts of discrete caribou herds of definable sizes and ranges came a renewed suspicion that the barren-ground caribou population of the NWT was declining. Such fears prompted the appointment of a Royal Commission in 1919 to investigate the matter and also to examine the possibility of muskox and reindeer ranching in northern Canada. Chiefly from the testimonies of an arctic explorer, R. M. Anderson, and an arctic trader, Captain Pedersen, the commissioners concluded that barren-ground caribou were being seriously threatened by over-hunting and predation. The over-hunting was a side effect of whaling in the Beaufort Sea at the turn of the century, and of the fur trade boom which lasted through the 1920s.

The report of the Royal Commission formed the prevailing consensus on caribou in northern Canada, and through its conclusions and recommendations directed caribou research in the NWT for the next 25 years. In response to the apparent plight of barren-ground caribou portrayed in the report, the Department of the Interior appointed as a Special Investigator, W. H. B. Hoare, an arctic missionary who had testified before the Royal Commission. Hoare's instructions emphasized the simplistic attitudes of this era: he was to simultaneously investigate range ecology, caribou distribution, human utilization of caribou and its impact on caribou populations, as well as educate native people about conservation. Despite its unrealistic aims, this was the first government project in the NWT to be solely devoted to caribou, marking the beginning of management-related research which continues to this day.

After an adventurous two years on the barrens, travelling mainly by dogs in all seasons, Hoare concluded that the formerly great migrations from the mainland to the arctic islands had been deterred by a string of trading posts along the coast which "terrified" caribou by producing coal and oil smoke. Also the traders provided high-powered rifles to the native people and encouraged them to hunt caribou inland in the spring, when formerly such people had remained on the sea coast hunting seals. He concluded that "if drastic steps are not at once taken to remedy the evils, in a very short time the story of the barren-ground caribou will coincide with that of the plains buffalo. . . . It is doubtful if . . . there are three millions, that is only one-tenth of Seton's 1906 estimate of thirty millions of caribou." Hoare's observations and recommendations were influential in subsequent revisions of territorial game laws, predator control measures, the establishment of game sanctuaries, and the introduction of reindeer.

THELON GAME SANCTUARY

Concurrent with the concern for barren-ground caribou was the urgent need to protect muskoxen, particularly on the mainland, from complete extinction. This prompted the establishment in 1927 of the Thelon Game Sanctuary which was also considered an advantageous refuge for barren-ground caribou. Thus a 1940 report on Thelon wildlife devoted three times as much space to caribou as to muskoxen. This investigation was undertaken in 1936 by W. H. B. Hoare and C. H. D. Clarke. In his report, *A Biological Investigation of the Thelon Game Sanctuary*, Clarke thoroughly reviewed existing caribou information with an unprecedented objectivity that reformed the basis of caribou ecology in the NWT and introduced what could be termed the "modern" approach to caribou science. Of particular interest was his analysis of the caribou questionnaires which had been annually distributed among northern residents

Bulls battle for the right to breed with cows.

since 1934 by the Northwest Territorial Administration. From these Clarke produced maps of typical barren-ground caribou distribution in July and January. His 1940 interpretations of seasonal concentrations share some remarkable similarities with those of the Bathurst, Beverly, and Kaminuriak herds, which would not be "discovered" or documented for another three decades.

Clarke of course could not resist a few population calculations, one of which was a total of 3,000,000 caribou on the "eastern barrens" based on a revised estimate of total range and a carrying capacity of 60 acres per animal from Alaskan reindeer data. Without the means of actually being able to count caribou, there was no other method of estimating population size. The only refinements since Seton's time were the use of Alaskan reindeer rather than Illinois cattle, and a better estimation of range from more precise maps of the NWT. All this was to change, however, after World War II, with the advent of modern "bush planes."

THE FIRST AERIAL CENSUS

In 1947 as a result of caribou declines in Quebec and Labrador, a federal-provincial wildlife conference passed a resolution to investigate the status and utilization of barren-ground caribou between Hudson Bay and the Mackenzie River. This mammoth project was undertaken by A. W. F. Banfield of the Canadian Wildlife Service and a staff of seven field assistants, including Farley Mowat, who with another employee was assigned to study wolf predation in the Keewatin during the summer of 1948. Mowat's rather fanciful recollection of that summer eventually appeared as the book *Never Cry Wolf*.

Banfield realized that complete coverage of the immense study area would require extensive use of small aircraft, the best ones available being the Norseman and the Beaver. For the first time it was possible to map migration trails, photograph herd aggregations, and census populations. In the two years from 1948 to 1950 Banfield and his staff acquired more

caribou data than had been accumulated in the previous 300 years. This material was initially summarized in a "popular" edition but in 1954 was fully published in two volumes entitled *Preliminary Investigation of the Barren Ground Caribou*. This was the first monograph about caribou in the NWT and it contained a wealth of new material concerning the barren-ground subspecies. Following Clarke's suggestion that barren-ground caribou were organized into distinct herds, Banfield identified 19 separate herds based on their winter ranges. This was the right idea but the wrong season, since caribou continually shift among winter ranges and therefore no meaningful identity could be assigned on that basis.

FURTHER DECLINES

Undoubtedly the major impact of Banfield's study was a new population figure, based for the first time on aerial surveys. The total of 668,000 computed for the entire region was so stunningly small compared to what had been expected from 50 years of theorizing, that the results were not fully accepted until subsequent surveys appeared to confirm them. Banfield's report concluded with a lengthy description of human utilization of caribou. From his population data and an analysis of various harvest statistics he believed that even the present caribou population could sustain a dependant human community if harvesting were restricted to basic needs and there was no wastage. He also felt that increasing loss of winter range due to forest fires caused by humans was an important factor in the caribou decline. Surprisingly, even though Banfield stated that the significance of wolf predation had been greatly over-estimated, the Canadian Wildlife Service used his report as the impetus for a large scale wolf poisoning program beginning in 1951 — the reasoning being that it seemed easier to control wolf numbers than to modify harvesting methods.

One of Banfield's colleagues was J. P. Kelsall, who took charge of caribou research by the Canadian Wildlife Service from 1950 to 1959. Under his guidance a second range-wide census was conducted in 1955. It produced an estimate of 279,000 caribou. In 1957-58 results from a number of censuses gave a total of 200,000. These figures confirmed the suspicion that caribou were undergoing a drastic decline, and in 1960 a federal order-in-council declared barren-ground caribou an endangered species in the NWT. The crisis was blamed mainly on hunters. During the following decade, however, there was some indication that the downward trend in caribou numbers had been reversed, and regulations, which had been tightened up somewhat during the 1950s, were relaxed.

In retrospect it is impossible to determine how much of the crisis was reality and how much merely a product of the new aerial surveying methods. By today's standards none of the survey results would be considered even remotely accurate, much less meriting comparison with each other to establish a trend. But with aerial censusing being "high tech" for that era, the data were accepted with few reservations.

In 1968 the Canadian Wildlife Service released Kelsall's book, *The Migratory Barren-Ground Caribou of Canada*, which summarized research on barren-ground caribou up to 1962. This book, which took four years to write, immediately became the biologist's bible and still remains indispensable as the principal source of caribou information for that period.

HERDS IDENTIFIED

Despite more than a decade of distribution studies supported by aerial surveys, the key to identifying discrete populations of barren-ground caribou had not been found. Biologists supposed that a pattern of herd distributions existed but the jigsaw pieces they devised kept splitting up and regrouping on them. This prompted a large scale tagging pro-

gram which began in northern Manitoba in 1959 and was extended to the NWT in the 1960s.

Tagging results indicated that each year caribou return to the same calving area regardless of where they spend the winter. Accordingly in 1967 the Canadian Wildlife Service hired D. Thomas to census the barren-ground herds and follow their spring migration to the tundra. Thus Thomas was able to document the gradual concentration of caribou from widely scattered winter ranges below the treeline into four compact migratory herds which proceeded rapidly toward separate tundra areas where they calved. He concluded that ". . . it would seem appropriate to identify several populations of caribou on the basis of where they commonly produce young." This simple statement revolutionized caribou research and management in the NWT.

Henceforth biologists were able to document seasonal distributions for each of the barren-ground herds, to census them individually, and to manage them as essentially separate entities. Thomas christened these herds after particular water bodies in the calving grounds: Bluenose Herd (Bluenose Lake), Bathurst Herd (Bathurst Inlet), Beverly Herd (Beverly Lake), and Kaminuriak Herd (Kaminuriak Lake). To this original list several smaller populations in the north Keewatin and Baffin Island have since been added.

THE PRESENT

In 1966, the Canadian Wildlife Service began the last of its large scale studies, focusing this time on population dynamics, human utilization, and range conditions of a barren-ground herd. The herd they chose was the Kaminuriak, which proceeded to confound scientists by declining rapidly in the 1970s and bouncing back suddenly in the 1980s. This caribou conundrum with its attendant confusion and confrontation led ultimately to the formation of the Beverly and Kaminuriak Caribou Management Board, which is composed of native users as well as biologists and administrators, and which reviews and recommends management approaches for these herds.

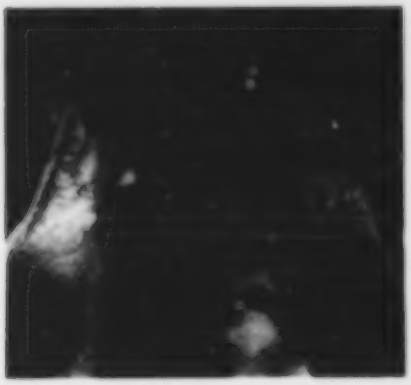
By the early 1970s the Canadian Wildlife Service had withdrawn from its lead role in caribou studies, and the territorial Game Management Division (now the Department of Renewable Resources) had taken over.

Since then a number of important events have occurred. First and foremost is the general resurgence of caribou numbers, a welcome trend but one whose cause is not completely understood. A second milestone is the use of photographic techniques to survey caribou, and the verification of their superior accuracy over the older visual survey methods. Next, the placing of radio-collars on comparatively large numbers of caribou marks a breakthrough in documenting caribou movements. Finally, the growth of native organizations and their determination to be a part of the management process has also contributed to modern caribou studies. Some of these organizations have recently taken on the difficult and complex task of collecting harvest data.

Over the past century, caribou research in the NWT has gradually evolved from the domain of foreign adventurers, to the jurisdiction of federal administrators, and eventually to the cooperative authority of local communities and the territorial government.

The importance of cooperation highlights an interesting point: research is still an essential ingredient in caribou management, but it is not as preeminent as it once was. With intense public interest at all levels — regional, national, and international — caribou management is influenced as much by politics as it is by the results of research. This means that consultation and communication are increasingly vital to managing caribou, as well as essential skills for the biologist in today's world.

Two antlerless bulls have a brief disagreement.



BLUENOSE HERD

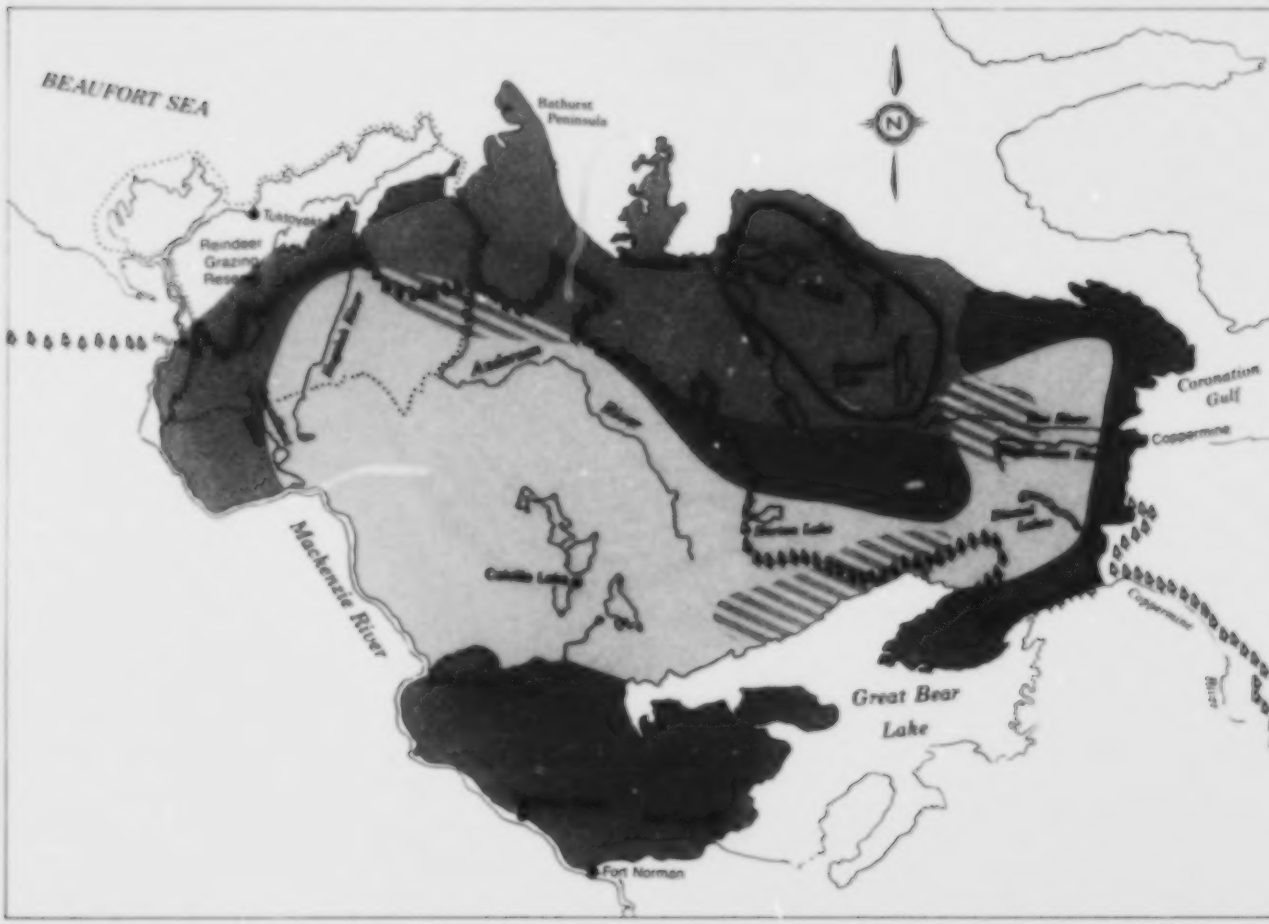
BY PAUL LATOUR

The Bluenose herd of barren-ground caribou is named after Bluenose Lake, near which most of the herd has traditionally calved. This herd has been the least studied of the four major mainland herds, and is probably the least utilized. The total range of the Bluenose herd is bounded by the Mackenzie River in the west, Coronation Gulf in the east, Great Bear Lake in the south, and the mainland coast in the north. The boundary between the Bluenose herd and the herd which lies to the east (the Bathurst) is not known with certainty. In some years, winter ranges of the two herds may overlap, and there may even be some interchange of animals between them. In the west, the presence of caribou in the Reindeer Grazing Preserve has contributed to losses of reindeer through straying.

RANGE USE

Like most barren-ground caribou, the Bluenose herd moves between distinct summer and winter ranges, with some portions receiving more frequent and intensive use than others. The wintering range customarily centres about the forested lake country north and northwest of the community of Colville Lake. Lesser densities of overwintering caribou can usually be found east of Colville Lake, along the north shore of Great Bear Lake, and in the area drained by the Kugaluk and Travaillant Rivers. Also, a portion of the herd usually winters above treeline near Dismal Lakes and the Rae and Richardson River valleys.

In March, the Bluenose herd begins moving northward on a broad front and by May can be found on the tundra east of the Anderson River and



USUAL DISTRIBUTION OF BLUENOSE CARIBOU IN RECENT YEARS

north of Horton Lake. In general, cows and yearlings form the vanguard of this spring movement, followed by the bulls. This broad northerly and northeasterly migration continues through May and early June, whereupon the pregnant cows arrive in the vicinity of Bluenose Lake. Here the majority of calving occurs, synchronized within approximately the first 10 days of June. The high barren country west and northwest of Bluenose Lake drained by the Brock and Roscoe Rivers is a favoured calving area. Yearling caribou tend to concentrate on the periphery of the calving grounds. Sporadic calving also occurs immediately northeast of Bluenose Lake and has been observed on the Bathurst Peninsula in some years.

Immediately after calving, the cows, newborn calves, and yearlings form groups of several hundred to several thousand individuals, and a north and westerly movement toward the mainland coast takes place. At this time the bulls also arrive at the coast and mingle with the cows and young. Much feeding on the fresh and abundant plant growth takes place as the caribou build up fat reserves for the approaching winter. Through August and September there is a gradual drifting westward and late September finds the herd in a broad front along the treeline. It is here that the rut commences and continues well into October as the caribou move farther

into the timbered portion of their range. November finds the Bluenose herd established on their winter range, although bands of caribou undergo local movements in search of suitable forage throughout the winter months.

As with other caribou herds, the Bluenose herd has shown periodic and largely unpredictable shifts in its annual migrations. In 1983, instead of a concentrated and constant northward migration to the calving grounds, the Bluenose herd was observed spread in small groups over a large area between Coppermine and Anderson River and movement was slower than in previous years. Although numerous cows did eventually calve in the Melville Hills, the time of peak calving was delayed by four or five days and some cows calved in flatter and lower areas far to the east and west of Bluenose Lake. The spring melt was estimated to be three weeks later than normal in 1983, but it is not known whether this was a major influence on caribou movement and calving that year. In the autumn of 1983, snowfall and general freeze-up were delayed and caribou penetrated southward into the Fort Norman and Fort Franklin areas by late October. Several thousand caribou remained in this area for much of the winter and according to long-time residents this had not occurred since the early 1950s. In 1984 caribou kept to their "normal" wintering areas, and did not penetrate as far south as in the previous year.

POPULATION STATUS

It is suspected that around the turn of the century the Bluenose herd suffered significant losses to hunting parties which provisioned whaling ships. Whalers began overwintering in the Beaufort in 1890 and actively plied the waters for nearly 20 years before the market failed. No sooner had whaling collapsed than the fur trade boomed and fur trade posts dotted the arctic coast during the 1920s. The net effect of these activities on all wildlife can only have been deleterious. For Bluenose caribou, it probably meant not only reduced numbers but also changes in distribution patterns.

It was not until 1949 that the first population estimate was given for the caribou north of Great Bear Lake. By 1974, there had been a total of 11 surveys with estimates ranging from 5,000 to 92,000. While these surveys contributed useful information and provided the best available data up to that time, the reliability of their estimates is now questioned due to imperfections in survey techniques and uncertainty regarding the eastern boundary of the herd.

Most subsequent surveys supported a population estimate in the 30,000 to 40,000 range, and it was generally believed the herd's numbers were stable. In 1983 two surveys were conducted: one employed the standard techniques and produced an estimate of 30,000 - 50,000; the other employed photographic techniques and produced an estimate of 50,000 - 80,000. The photographic estimate is considered the more accurate one, with the higher values being due to the difference in technique and not a real increase in caribou numbers over previous years. Thus the herd is still considered stable, only at a higher level than was previously thought.

UTILIZATION

Several Dene and Inuit communities rely on the Bluenose herd as a major source of meat. For communities such as Inuvik, Fort Good Hope, and Colville Lake, the caribou are available solely during the winter months. At this time the Bluenose herd has penetrated to the western and southern-most portions of its winter range and hunters can reach the caribou by snowmobile. Other communities such as Paulatuk and to a lesser extent Tuktoyaktuk have accessibility to Bluenose caribou primarily during the fall and spring migrations when the caribou pass close by. People from Fort Franklin may hunt

Caribou often cross rivers at the same place year after year.

the herd in either winter or summer along the north and northwest shores of Great Bear Lake. The greatest share of Bluenose caribou is taken by Coppermine. Most hunting by that community occurs west of the Coppermine River in fall, winter and spring; caribou taken east of the river are presumed to belong to the Bathurst herd.

Hunter kill records indicate that the annual kill of Bluenose caribou averages between 3,500 and 5,000 animals depending upon the availability of caribou to the communities. This includes a commercial harvest of up to 950 (in 1986), the meat being sold by hunters to various commercial outlets in their respective communities. In most years the full quota is not realized and the take is usually 500 - 600 caribou. The total hunter kill, including a minimal take of about 100 by non-native hunters, suggests that the Bluenose herd is at or approaching the maximum harvest allowable for herd stability.

RECENT STUDIES

Calving ground surveys, spring recruitment counts, and fall classification counts are carried out every few years. From these studies are produced population estimates, data on calf and yearling survival, and sex and age composition of the herd. Photo survey techniques are likely to become increasingly important in the future for monitoring population trends.

A new project undertaken in 1985 involved netting 30 adult cows from a helicopter and fitting them with collars containing radio transmitters. These caribou are then relocated four or five times a year from aircraft. The purpose is to confirm the location of traditional calving grounds, make it easier to find groups of caribou for spring and fall surveys, and to add to our knowledge of large scale movements and possible mixing between Bluenose caribou and other herds.

Bathurst caribou near the treeline in September.

BATHURST HERD

BY DOUG HEARD

The name of this herd derives from Bathurst Inlet, near which calving has traditionally occurred.

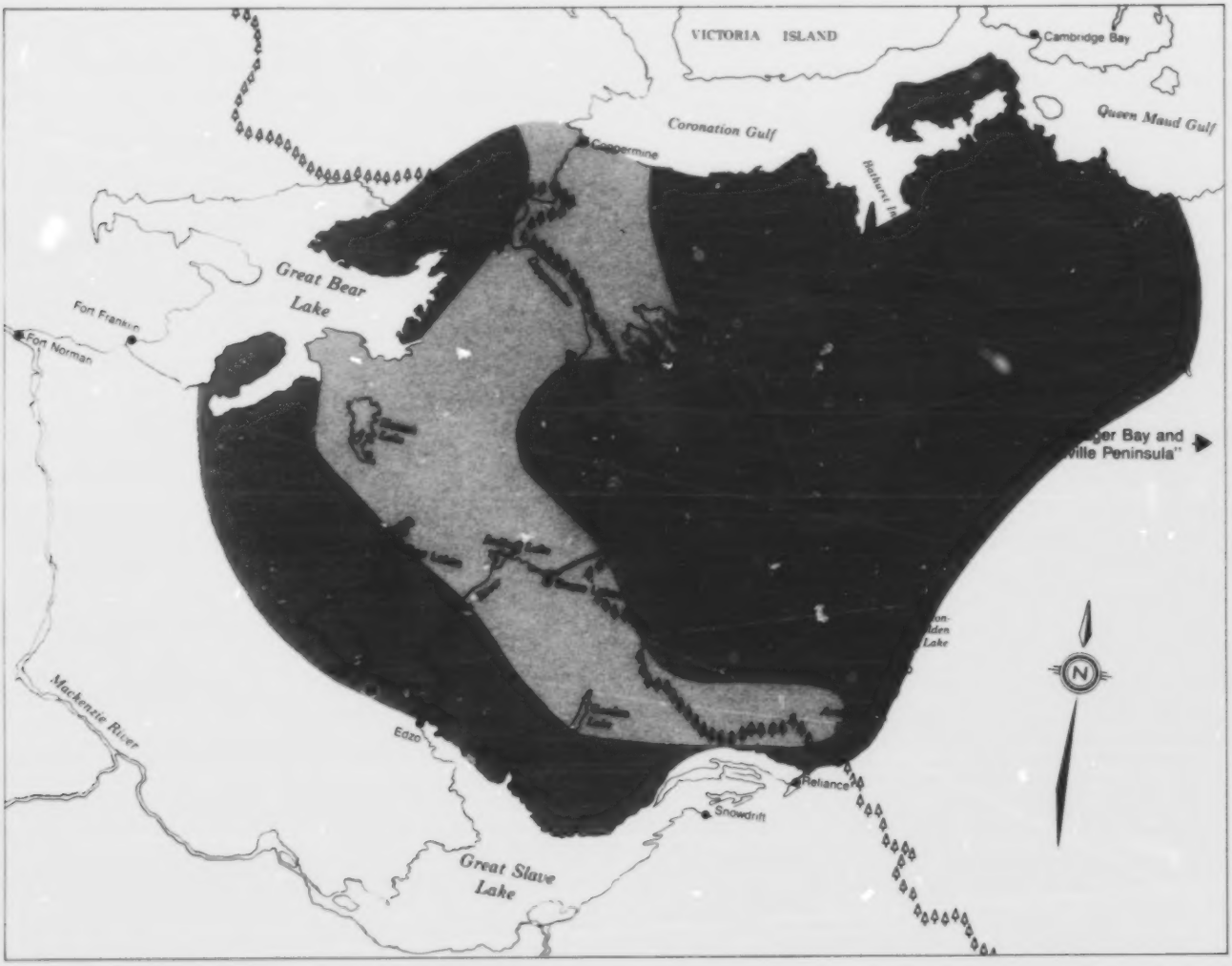
The Bathurst herd is accessible to more people than any other herd in the NWT. This is because the capital city of Yellowknife, which lies at the southern edge of the herd's range, is home for nearly one-quarter of all people in the NWT, and because for many years winter roads have linked Yellowknife with mines farther north. These roads are constructed across frozen lakes and are usually passable between January and March. Though intended for resupplying mines, they can also at times provide hunters with easy and instant access to Bathurst caribou. One road, known locally as the Gordon Lake road, has been declared a special management area, and legislation is in place to control its use by hunters if the situation warrants it.

RANGE USE

Thirty years ago part of the Bathurst herd calved at the south end of Bathurst Inlet, but in the last 15 years almost all calving has occurred east of the inlet. The present calving area is low and flat, in sharp contrast to the high sea-cliffs and steep-sided river gorges found adjacent to Bathurst Inlet.

Calving occurs in the first two weeks of June and the cows begin leading their calves west and southwest almost immediately thereafter. In early to mid-July the hills south and east of Bathurst Inlet are spotted with bands of caribou. Bulls and yearlings are much more common in those groups than on the calving ground.

As July progresses the main body of the herd increases its pace and moves west up the Burnside River. More bulls are collected along



USUAL DISTRIBUTION OF BATHURST CARIBOU IN RECENT YEARS

the way. Some animals remain around Bathurst Inlet. When the main body of the herd reaches the northwest corner of Contwoyto Lake, the herd splits. Contwoyto Lake is too wide to swim. Those animals that don't pass to the north of the lake continue to move southeast along the shore. The drive to move southwest is still strong and the herd is never far from the Contwoyto shore. As a result the caribou swim every inlet and bay rather than moving farther from the shore where they could walk the entire way. This behaviour is quite striking when one observes their uneasiness at water crossings and their occasional reluctance to cross.

By late July, the first caribou swim the Contwoyto River between Pellatt and Contwoyto Lakes, and continue south and southwest. Those animals that passed to the north of Contwoyto Lake are near Point Lake.

Living is easy in August and early September. Fly and mosquito harassment is minimal, weather is moderate, food is abundant, and wolves are still tied to their dens. Caribou take full advantage of this period of plenty. They slow their movement, break into smaller groups,

Caribou bedded down on a frozen lake.

and spend more time eating. This period is a critical stage in the annual cycle. Each individual must assimilate enough energy to complete its moult and antler growth and to put on fat for the winter. Younger animals must also put energy into body growth and cows must also produce milk to supplement the diet of their rapidly growing calves.

During this time small groups of caribou may be observed almost anywhere on their range north of the tree-line, though in some years some caribou may even wander well into the forest.

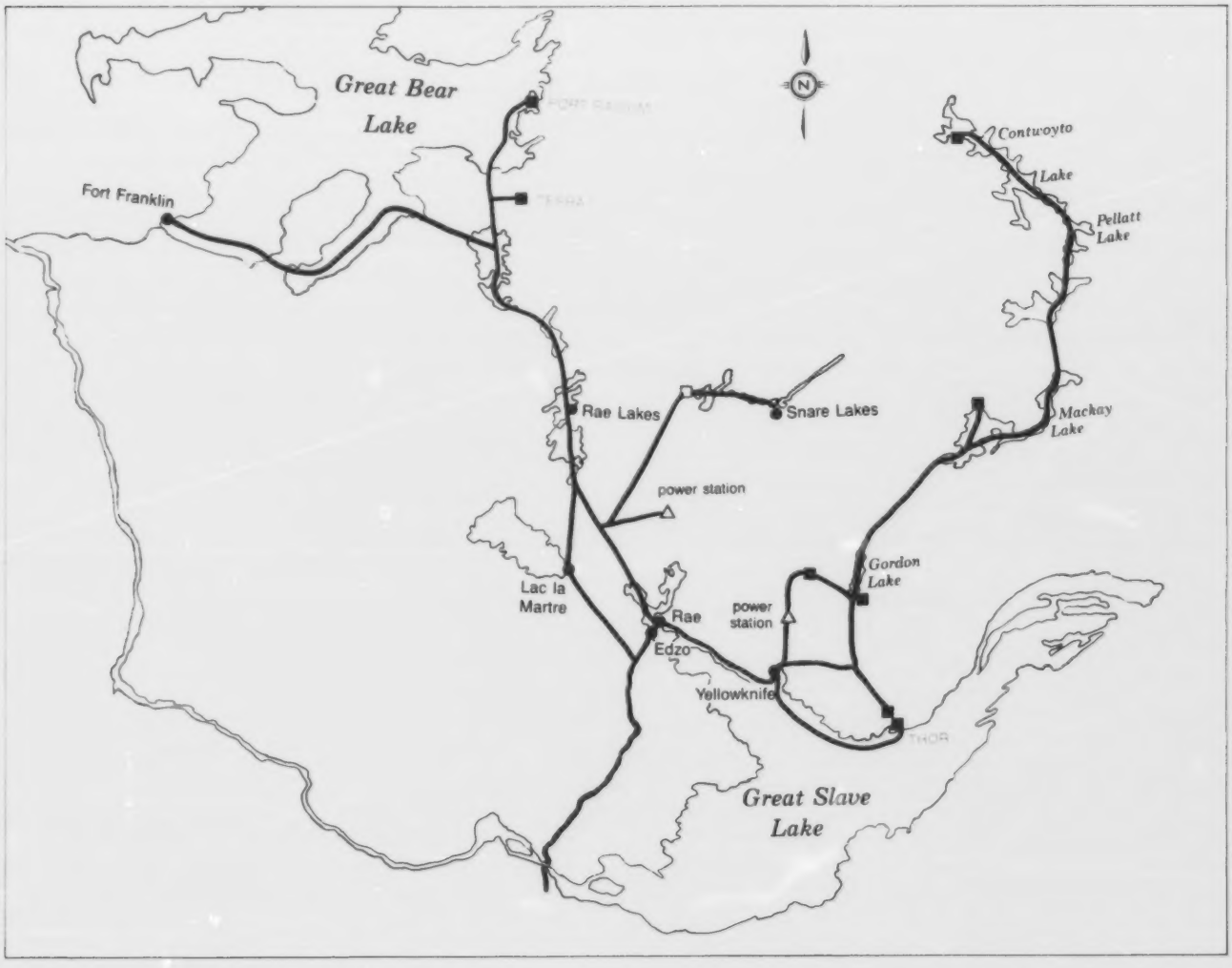
In late September and October groups of caribou begin to coalesce. Rutting behaviour begins — generally near treeline — and movement into the forest continues during the breeding period.

After the rut, caribou settle into their winter pattern. Again group size declines and movement is reduced. Most of the herd can be found in three or four major areas. There are usually animals in the narrow band of trees north of the east arm of Great Slave Lake, near Gordon Lake, Hottah Lake, and at Takijuq Lake out on the barrens. Small groups may be found anywhere from Bathurst Inlet to Great Slave Lake. During the 1950s, a large part of the herd wintered south of Great Bear Lake almost as far west as the Mackenzie River.

Bulls occupy areas farther south than most cows with calves but there is much variability. Groups drift about between November and March and those spending the early winter near Reliance may be near Gordon Lake by January or March. There is probably some winter range overlap between the Bathurst and Bluenose herds, and between the Bathurst and Beverly herds.

In late March and early April group size again increases as the animals begin moving toward the calving ground. Those animals between Gordon and Indin Lakes funnel across Courageous Lake and probably pick up the Hottah animals by the time they stream across Contwoyto Lake. The Takijuq and coastal wintering caribou move straight east across Bathurst Inlet.

The pregnant cows lead the



ROADS ON THE BATHURST CARIBOU RANGE, 1976-1987

LEGEND

- Community
- Mine
- Undeveloped mine site as of 1987
- Gold
- Silver
- Rare earths
- All-weather road
- Winter road used for at least 5 years
- Winter road used for less than 5 years

Note: Not all mines are still in operation. Not all winter roads are still in use.

movement. By now their 10-month-old calves are on the verge of independence. Some, especially the males, don't keep pace with their mothers but lag behind and end up with the bulls and two- and three-year-old females. By late May most of the animals crossing Contwoyto Lake are bulls and immature caribou. Some cows are already waiting on the calving ground to give birth. Any calves, now exactly one year old, that kept pace with their mothers form bands of their own and stay mostly on the edge of the calving ground.

Prior to 1920, a caribou population of substantial size (the Dolphin and Union herd) wintered on the Bathurst range and calved on Victoria Island. The annual crossings by this population decreased in the 1920s, probably as a result of extensive hunting brought about by coastal trading and the introduction of rifles. In the 1980s caribou from Victoria Island began migrating to the mainland in early winter and back again in later winter. These caribou are readily distinguishable from mainland caribou; they are smaller with shorter faces and paler coats. They are similar but not identical to Peary caribou.

Roads increase access to caribou by hunters.

POPULATION STATUS

Over a period of 20 years (1948-67), ten attempts were made to estimate the number of caribou on the Bathurst range. From these early attempts the Bathurst herd is believed to have numbered somewhere between 100,000 and 300,000 during the period 1949-60. Because the aerial survey technique was new and imperfect, the data obtained cannot be used to substantiate a trend in population size for the herd — though in the past the data were believed to indicate a decline.

Population estimates derived from complete range surveys were discontinued after 1967 in favour of calving ground surveys from which total herd size was estimated. Between 1965 and 1980, nine surveys were conducted on the Bathurst calving ground. Throughout this period the objectives, methods, and analysis of the surveys were continually being modified. The suspected trend was still a decline in numbers.

In 1980, however, the first photographic survey (of any herd) was conducted, in conjunction with a standard aerial survey employing only visual observations. The two surveys revealed a sizeable discrepancy in the results. In 1982 the calving ground was again surveyed by both techniques; the visual resulted in a total herd estimate of 85,000 - 120,000, and the photographic 160,000 - 220,000. The latter was believed to be more accurate.

The 1982 survey suggested that the apparent 10-year decline of the herd had ended, but it was the 1984 count that documented the most dramatic change of events. The 1984 survey showed that the herd had increased to almost 400,000 animals. The trend continued in 1986 when survey results gave an estimate of 486,000.

The herd could not have increased so much so quickly without an influx of animals from elsewhere. The most likely source of immigrants is the northeastern mainland: Queen Maud Gulf, Wager Bay, and Melville Peninsula. Movements of caribou in those areas are unknown but presently under investigation.

Bulls and cows form mixed groups during the rut.

UTILIZATION

Bathurst caribou are an important resource to many individuals: Inuit hunters from Bay Chimo (Umingmaktok), Bathurst Inlet, Coppermine, and Cambridge Bay; Dene hunters from Snowdrift, Detah, Rae-Edzo, Rae Lakes, Snare Lakes, Lac La Martre, and Fort Franklin; non-natives hunters from Yellowknife; and canoeists, naturalists, and sightseers from around the world. For all but the latter group, caribou are primarily a source of meat. Estimates of the numbers killed each year range from 8 to 12 thousand. Bulls probably predominate in the kill if hunting patterns are similar to other herds. Rae-Edzo and Coppermine hunters shoot the most caribou, primarily because of the relatively large size of those communities. The benefits derived from this herd in terms of meat are clearly enormous. The intangible benefits are also great. The knowledge that Bathurst caribou exist as a healthy, productive living unit enriches the life of hunters and non-hunters alike.

The fall hunt is for many the highlight of the year. For all Dene except those at Snare Lakes, to hunt caribou in the fall involves a long trip. Traditionally Rae-Edzo people canoed up the Snare River system but Twin Otters allow more people to participate, reduce the effort, and guarantee success. The prize is still a fat bull but animals of all ages and both sexes are shot. For most, this will be the first fresh meat they have had since the caribou left the previous April. The feast is suitably appreciated.

After the big September harvest, hunting quickly declines. People have temporarily satisfied their craving for fresh meat, the bulls become less edible as their bodies change in preparation for the upcoming rut, and travel becomes more difficult as freeze-up begins.

Once snowmobile travel is possible in November hunting begins again but rarely with the intensity seen in

September. Occasionally hunting expeditions are mounted when caribou are relatively inaccessible but for the most part hunters go out alone or in small groups. After Christmas, people from Fort Franklin may undertake snowmobile trips of up to 800 km round trip to reach the Bathurst herd in those years when it winters no farther east than the Hottah Lake area. The Satudene, or Great Bear Lake people, and Dogrib people from Rae Lakes, often set up small camps in the area, spending weeks or even months hunting caribou and making dry meat.

When caribou are immediately available hunting can occur with amazing intensity. In 1974 Coppermine residents killed thousands when a segment of the Bathurst herd took up residence near town. Early in 1980 almost 1,000 caribou were shot when animals were on the Gordon Lake winter road.

Non-native or "big game" hunting occurs primarily in the winter when caribou are most accessible from Yellowknife. Yellowknife is home for most of the big game hunters in the NWT; they shoot about 5% of the caribou killed each year from the Bathurst herd.

As of 1986 there was a commercial quota (allowing the sale of meat) for 650 caribou from the Bathurst herd. In addition, a total of 400 tags were made available to Class B outfitters for use by hunters from outside the NWT (or hunters who did not qualify for the 2-year residency requirement).

RECENT STUDIES

Spring recruitment counts are conducted usually every year, and aerial surveys of the calving ground usually every two years. Specimens are also collected from a check station on the Gordon Lake winter road to determine the health and productivity of animals.

The Bathurst herd has a high associated population of wolves. To learn more about their effect on caribou, 39 were radio-collared below the treeline in March and April of 1979 and 1980, then tracked during May and June. It was found that some wolves followed caribou to their calving grounds, while others (mainly pregnant females) remained behind at the treeline. Caribou were found to be the most important food item for the wolves studied. It was estimated that one wolf would eat 30-50 caribou each year.

Following community consultations in 1979, 202 caribou were collared. Due to objections raised by native people, there had been no tagging or collaring of caribou since the 1960s, when the Canadian Wildlife Service had marked 476. All tagging and collaring of Bathurst caribou has been done at Contwoyto Lake. These studies have helped define the range of the herd.

In 1988 a draft management plan for the herd was released. It recommended keeping the population level high enough (between 300,000 and 600,000) to allow an annual harvest of at least 16,000 caribou.

Doug Heard

A newborn calf.

BEVERLY HERD

BY ANNE GUNN

Since the 1970s the Beverly herd has usually been considered in conjunction with the Kaminuriak herd. In 1982 responsibility for managing both herds was assumed by a board made up of government members and hunters from Manitoba, Saskatchewan, and the NWT. The reason for this arrangement is that in most years part of both herds winter south of the NWT border.

In the 1970s there was an apparent decline in the size of the Beverly herd. It was blamed on many things: wolves, forest fires, overhunting, and mining exploration. One of the most famous events associated with this herd occurred in 1978 when the hunters of Baker Lake, concerned over the welfare of the caribou, unsuccessfully tried to stop mineral exploration in the Keewatin by bringing legal action against the federal government and several mining companies. That same year the Caribou Protection Measures were introduced.

The Beverly herd received more national exposure in 1979-80 when it wintered deeper in northern Saskatchewan than it had in many years. The harvest immediately tripled and there were many allegations of wastage.

RANGE USE

The winter range used by the Beverly herd in the last 50 years stretches from the East Arm of Great Slave Lake to Reindeer Lake on the Saskatchewan-Manitoba border. It overlaps the Kaminuriak range in Manitoba, and occasionally (three times in the 1980s) some caribou have wintered north of the East Arm of Great Slave Lake — on the range of the Bathurst herd. Some caribou also winter on the tundra.

Generalities about where the Beverly caribou will winter in any one year are difficult to make as the timing and areas of use vary among years.

USUAL DISTRIBUTION OF BEVERLY CARIBOU IN RECENT YEARS

One area may be used for several years then abruptly abandoned. Some of the variations in range use reflect conditions encountered by the migrating caribou. If freeze-up is late, or if the caribou are south of the treeline early, large lakes which are still unfrozen (such as Manchester, Labyrinth, and Scott) can turn the caribou aside. Snow conditions and the timing of storms often modify movement and distributional patterns. For example, early winter rain and wet snow can form hard layers above the vegetation and force movements to more favourable areas.

In 1979 the worst fire season on Beverly range since at least 1950 (750,000 hectares burnt) was followed by the farthest southern penetration of Beverly caribou since the early 1960s. Biologists believe that snow conditions, not burnt range, was the cause of this unusual southern migration. Extreme penetrations to Cree Lake and Wood Buffalo National Park have been occasionally noted since the 1940s.

In March or April, as the warming sun and lengthening daylight hours are reflected in the melting and freezing of the crusted snow, the caribou begin to move north. The ease of following each other on snow-packed trails results in caribou moving in long strings along frozen water courses and

lakes where the wind has packed the snow into a hard and relatively shallow layer. Frequently the Taltson, Snowdrift, and upper reaches of the Thelon River are followed as they lead in the direction of the calving grounds. Cows often funnel between the Dubawnt and lower Thelon Rivers, sometimes leaving behind yearlings and juveniles. Since 1977 nearly all cows have crossed the Thelon River, usually in the area of Lookout Point or Ursus Islands, to reach calving grounds north of Beverly Lake. Bulls often winter farther south than the cows and sometimes follow different routes when they migrate north in spring.

From the late 1950s to about 1977, most calving was observed around Beverly Lake and the Thelon River system. Since 1977 most calving has occurred 100 km farther north, near Sand, Garry, and Deep Rose Lakes.

The calving grounds are a mosaic of small round hills, long sinuous eskers and, less frequently, rocky outcrops vegetated with lichens and low shrubs. Lying between those raised areas are flat expanses of tussock meadows and stands of sedge interspersed with lakes and pools. On the calving ground the landscape is indistinguishable from the surrounding country, except that it has slightly more rock outcrops. There are a few wolf dens on the periphery of the calving ground, but most wolves that hunt Beverly caribou den along the Thelon River and its branches.

The movements before and after calving that took the Beverly caribou north across Schultz, Aberdeen, and Beverly Lakes in the 1950s, 1960s, and early 1970s, no longer occur now that all calving takes place farther north. Post-calving movements recently have been to the southwest across the Thelon River at traditional water crossings such as Lookout Point. Large aggregations have also left the calving ground travelling west and southwest to cross the Hanbury at Lac du Bois, or Mary Frances, Clinton-Colden, and Ptarmigan Lakes. To fly over the central barrens in the deepening shadows of a low sun and see the myriads of old trails cut into the barrens, streaming around every lake, is to be reminded of the groups of tens, hundreds, and thousands of caribou that have used this area for centuries.

In summer the caribou gather in large aggregations to lessen the torment of mosquitoes, but in August the groups become smaller as the caribou scatter in their attempts to cope with warble and nosebot flies. The late summer and early fall movements are rarely monitored, but in many years the scattered groups reach the treeline in August. In late August and September, the caribou may reverse direction and return to the barrens near the Hanbury and Thelon Rivers. After the rut in October, they return to the taiga, often crossing the treeline along the Snowdrift, Taltson, or Dubawnt Rivers.

POPULATION STATUS

From the late 1940s to the 1960s caribou counts on the spring and winter ranges were too scattered and incomplete to produce a reliable trend of herd size. From 1971 to 1980 four surveys of the calving ground suggested a reduction in herd size, with the final estimate being 105,000. Biologists believed that the apparent decline could only be stemmed by a reduction in the kill by hunters.

Some Keewatin Inuit did not accept the results of these surveys. They insisted that, if anything, the Beverly (and Kaminuriak) herds were increasing since people were harvesting fewer caribou than in former times. Others suggested that the herds were merely occupying different ranges. Almost none believed that hunting was a problem.

By 1982 the trend appeared to have reversed. A visual survey of the Beverly calving grounds produced a herd estimate of 120,000 - 160,000, while a photographic survey resulted in an estimate of 150,000 - 240,000. In 1984 visual and photographic surveys produced estimates of 120,000 - 170,000 and 250,000 -

420,000, respectively.

The reasons why the herd may have decreased in the 1970s are complex and now hidden in the past. Wolves may have played a role. Like the Bathurst herd, the Beverly herd has a high associated wolf population. Predator control programs in the 1950s and 1960s attempted to reduce their effect on caribou. After these programs terminated, the recovery of wolves may have contributed to a decline in caribou numbers.

The recent increase in herd size is due to increased calf survival, which is probably a result of lower wolf predation. High prices for wolf fur have caused an increase in the wolf kill.

In 1987 a management plan produced by the Beverly and Kaminuriak Caribou Management Board placed the optimum herd size at 330,000 animals. A decline below 150,000 animals will be considered a crisis and emergency action recommended.

UTILIZATION

The unpredictable seasonal movements of caribou no longer inflict the potential of starvation on waiting hunters, but still affect hunting patterns. The people of Baker Lake, the only Inuit who hunt the Beverly herd, used to rely on the caribou which crossed the narrows and peninsulas of the large lakes along the Thelon River west of Baker Lake. As those traditional water crossings have been little used since the late 1970s, less hunting occurs in summer and more in early winter, especially if tundra-wintering caribou are relatively close to Baker Lake.

Once caribou reach the treeline they are hunted mainly by Saskatchewan Indians. People from Black Lake and Fond-du-Lac each take about one-third of the entire Beverly herd kill. The communities of Camsell Portage, Uranium City, Stony Rapids, and Wollaston Lake bring the Saskatchewan harvest up to about 80% of the total. People from these communities (and from Brochet and Lac Brochet in Manitoba) require a Border Licence A to hunt barren-ground caribou in the NWT. First issued in 1984, these licences honour traditional hunting patterns.

People living in Fort Chipewyan in Alberta require a Border Licence B to hunt Beverly caribou in the NWT. There is an annual quota of 400 for all holders of Border Licence B.

Other communities which hunt Beverly caribou are in the NWT: Reliance, Snowdrift, Fort Smith, and Fort Resolution.

In 1982-83 the total harvest of Beverly caribou was estimated at 6,000. However, the kill can soar dramatically if the caribou press close to settlements. In 1979-80 the caribou moved farther south than any year since the early 1960s and many wintered close to Black Lake and Stony Rapids. The surge of hunting that ensued brought in people from central Saskatchewan using winter roads established for mining exploration. The normal kill of Beverly caribou was tripled and, inevitably with such excitement and often inexperience, meat was wasted.

In 1987, a small commercial quota (50t) was issued to the Keewatin Wildlife Federation, an Inuit organization based in Rankin Inlet.

RECENT STUDIES

In the Keewatin during the 1970s the pace of exploration for uranium and other minerals increased. Baker Lake was the logistic centre for exploration activities, and those activities became increasingly associated by hunters with changes in caribou movements and numbers. The concerns of people at Baker Lake resulted in the establishment of Caribou Protection Measures in 1978. Briefly, the Measures prohibit industrial activity in specific areas on the Beverly and Kaminuriak range when cows and calves are near. No one can work near a water crossing, or do anything that blocks or diverts caribou moving to or from calving areas. Movements of the two herds are monitored by aircraft each year from May to July.

A bull in October during the rut.

In 1980 a three-year study on the effects of disturbance was begun. The physical characteristics of the Bathurst, Beverly, and Kaminuriak calving grounds were described, as well as traditional water crossings of the Beverly and Kaminuriak herds. Behavioural studies into the effect of helicopter activities were also conducted.

In 1982 a six-year study conducted by the Canadian Wildlife Service was begun. The study had three objectives:

- to determine the adequacy of winter range in the NWT to support the Beverly herd
- to study the movement and distribution of the Beverly herd in relation to burned areas, snow depth, and snow hardness
- to determine how quickly forest species (particularly lichen) recover after a fire

Field work concluded in 1987, and the report is expected out in 1989.

Other studies in the 1980s investigated the survival rate of calves over their first winter, and the causes of calf mortality. As with all mainland herds, a spring classification count is done every year to calculate the proportion of calves entering the adult population. Every second or third year a calving ground survey is conducted. Information from this survey is used to determine trends in herd size as indicated by changes in the number of breeding cows on the calving grounds.

The bumps along this caribou's back are caused by warble fly larvae beneath the skin.

F O U R T E E N

KAMINURIAK HERD

BY CORMACK GATES

The Kaminuriak herd is the easternmost of the four great herds of barren-ground caribou on the NWT mainland. It has been more intensively studied than any other herd. One reason for this attention was an apparent decline in size and withdrawal from its southern range in Manitoba. Though the entire mainland barren-ground caribou population underwent a similar decline in numbers from the 1950s through the 1970s, the Kaminuriak herd seemed to be diminishing at a faster rate, and by the late 1970s was thought to be on the verge of extinction. In 1982 this trend was dramatically, and mysteriously, reversed.

Since 1982 the responsibility for managing both the Kaminuriak and Beverly herds has been assumed by a board made up primarily of members from Manitoba, Saskatchewan, and the NWT. The reason for this joining of forces is that the traditional range of both herds is found in all three jurisdictions.

RANGE USE

The most consistent characteristic of barren-ground caribou is their changeability. This is nowhere more evident than for the Kaminuriak population, which occupies eastern Keewatin and northern Manitoba. Studies conducted during the 1950s and 1960s documented patterns of seasonal range use which were accepted as normal until the mid-1970s, when changes became the rule rather than the exception.

In general, most of the population in late fall migrated from the tundra to spend the winter south of the treeline. Caribou penetrated far into the boreal forest of northern Manitoba, at least to Southern Indian Lake, encompassing a wide area which spanned the breadth of the province from eastern Saskatchewan to the coast of Hudson Bay. A small portion of the population wintered north of the treeline along the coast in the vicinity of Arviat.

NORTHWEST TERRITORIES
KEEWATIN REGION
Wager Bay
N
Quoich River
Baker Lake
Chesterfield Inlet
Thelon River
Princess Mary Lake
Dubawnt Lake
River
Rankin Inlet
Whale Cove
Angusko Point
Arviat
HUDSON BAY
Hubbart Point
MANITOBA
SASKATCHEWAN
Indian Lake

In March, bands of caribou throughout the forest began grouping together along common migration trails, and moving northward with cows and juveniles leading the way. The intensity of this movement grew as the daylight hours lengthened with the coming spring. The caribou formed a broad front heading northeast between Kasba and Caribou Lakes. In April, Windy Lake, Nueltin Lake, Henik Lakes, and Hyde Lake were commonly used points along spring migration corridors.

This pattern persisted until 1975-76 when the majority did not migrate to the forest for the winter, but remained on the tundra. In particular, major groups began to occupy the northern end of the range, extending its boundaries north of Chesterfield Inlet and Baker Lake. The coastal tundra along Hudson Bay was also used by a greater number of caribou during the winter; this area extended from Hubbart Point in Manitoba to Chesterfield Inlet, varying between years. These new wintering areas were consistently used by large numbers of Kaminuriak caribou each year between 1975-76 and 1981-82.

In retrospect this change should not have been surprising since anecdotal records suggest that it had occurred several times since the mid-1930s. Nor should it have been surprising when the caribou shifted back to overwintering in the forest. This is in fact what happened in 1982-83. In that year, very few caribou were seen after the end of September on the tundra, but major numbers moved to treeline and farther south by November following the rut.

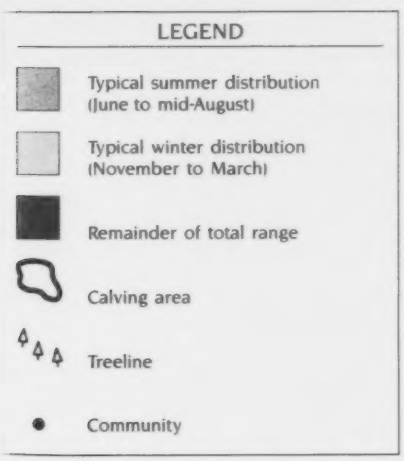
Typically the rut takes place in October, the peak being around the 15th to the 30th. During the rut the population can be found in several concentration areas. These vary between years, but the region between Henik Lakes and Maguse Lake frequently holds many caribou during the fall. In some years, however, large groups of caribou are found on the south side of Baker Lake and along Chesterfield Inlet in late October to early November. Many of these animals then move north across the Inlet when it freezes over in late November. In these years the Quoich River drainage holds a particularly high number of caribou through the winter. Caribou from the Kaminuriak population have also wintered southwest of Baker Lake around Pitz Lake and Princess Mary Lake.

In late winter caribou from all segments of the population begin to move toward a common calving ground. Although the exact location of the calving area varies from year to year, it is located generally in the same region. In some years calving cows concentrate in a relatively small area, while in others the calving area is large. The area occupied ranges between 1,000 and 18,000 square kilometres.

Shortly after calving, cows begin to form large nursery bands. By the beginning of July these groups may hold 20,000 or more caribou, but commonly range between 500 to 2,000 animals. By this time many bulls have joined them.

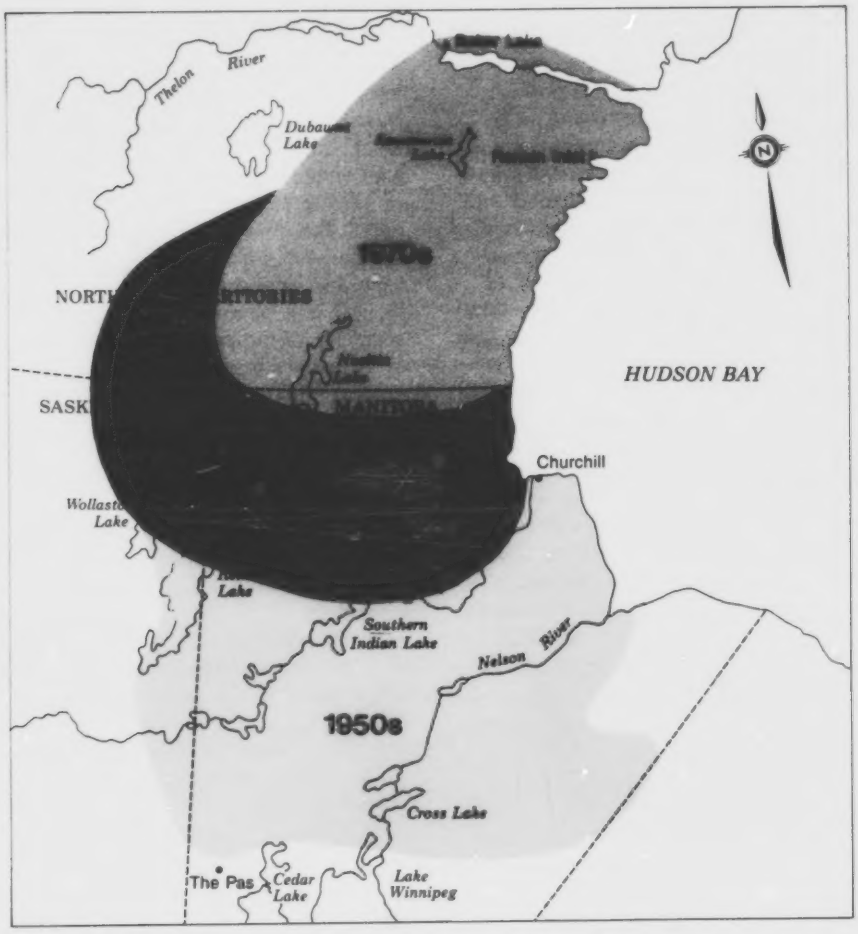
From the calving ground, post-calving groups commonly move northward, beginning a clockwise movement which carries them toward Thirty Mile Lake on the Kazan River, then toward the southeast side of Baker Lake and south past Banks Lake. By mid-July post-calving groups are found moving south across the Maguse River drainage and near the coast of Hudson Bay at Arviat. In August the groups disperse throughout the tundra range, only to form again in September, a prelude to the rut.

USUAL DISTRIBUTION OF KAMINURIAK CARIBOU IN RECENT YEARS



POPULATION STATUS

The earliest population estimates put the herd at over 100,000 prior to mid-century, and below that level from the late 1950s on. Calving ground surveys by the NWT Wildlife Service in the 1970s confirmed the apparent decline with herd estimates falling below 50,000. By the end of the 1970s there was serious concern that the herd might become economically



CHANGES IN DISTRIBUTION OF THE KAMINURIAK HERD SINCE THE 1950s

extinct — that is, that too few would remain to be of use or value to humans.

One reason for the decline was low calf survival. During the 1960s, about 60% died or were killed during the summer and little more than 20% of calves born in June survived to the following June. When they reached the age of one year they made up only 10% of the entire population. Wolf predation was thought to be the major cause. Wolves on the calving ground were relatively rare but each one probably killed large numbers of calves, and wolves were abundant among groups of caribou wintering in the forest.

Another major cause of caribou mortality was hunting. Stiffening resistance from people in the Keewatin, however, was an unexpected reaction to government urging that harvest levels be reduced. Hunters insisted that not only were caribou not declining, they were actually increasing. This surprising new trend was confirmed in 1982 and 1983 when visual aerial surveys produced estimates of 100,000 - 140,000, while a photographic aerial survey conducted at calving time in 1983 produced an estimate of 180,000 - 280,000. In 1985 visual and photographic estimates of 200,000 and 260,000 - 380,000, respectively, were obtained. In 1987 a photographic post-calving survey produced a minimum estimate of 260,000 animals.

Explanations for the reversal are highly speculative. During the early 1980s calf survival was higher than in the 1960s when it was last monitored. Higher survival may have resulted

Cows and newborn calves form "nursery bands."

from a reduction in the wolf population associated with the introduction of snowmachines around 1970; wolf hunting is lucrative and highly enjoyed by residents of Keewatin. However, the increase in the Kaminuriak population cannot be explained entirely on the basis of natural rate of increase. Other explanations include theories of massive immigration from adjacent populations or failure of previous surveys to adequately delineate all calving grounds of the herd.

In 1987 a management plan completed by the Beverly and Kaminuriak Caribou Management Board placed the optimum herd size at 300,000 animals. A decline below 150,000 animals will be considered a crisis and emergency action recommended.

UTILIZATION

Historically the Kaminuriak caribou population has been hunted by two groups of native Canadians. During the winter when the herds penetrated far into the northern boreal forest of Manitoba and Saskatchewan, they were hunted by the Chipewyan Dene. Chipewyans also traditionally hunted caribou in the barrens region during the summer, following the great water routes of the Kazan and Dubawnt drainages. Samuel Hearne's observations of 1769-72 indicate that in the 18th century the region south of the Thelon River to the edge of the forest was used almost exclusively by the Chipewyan people during summertime and perhaps to some extent in the winter as well.

During the 17th and 18th centuries the Inuit population occupied the coastal area in the southern Keewatin. Hostility between them and the Chipewyans probably precluded extensive use of the southern barrens by Inuit.

Occupation of this area by Inuit followed its abandonment by Chipewyans in the late 19th century. Two factors were important in reducing use of the barrens by Dene. A smallpox epidemic between 1771 and 1796 decimated their numbers and the fur industry began to establish permanent trading posts, reducing the number of Dene following a nomadic life style.

Inland expansion by Inuit reached a peak in the mid-1800s. Inuit groups began to rely heavily on the regular migrations of the Kaminuriak caribou population. Camps were strategically established at major water crossings where large numbers of caribou could be speared as they were swimming across. In the 1920s camps containing six or seven families were known at Windy Lake, the water crossing between North and South Henik Lakes, Padlei, Heninga Lake, the south end of Yathkyed Lake, Angusko Point on Hudson Bay, along the Maguse Lake and River system, the north side of Quartzite Lake, on

Two cows in June.

the Ferguson River by Last Lake, at the north and south ends of Kaminuriak Lake, and at a few sites on the Kazan River. Kaj Birkett-Smith, who accompanied the Fifth Thule Expedition, estimated that there were about 110 families of "Caribou Inuit" in the region in 1922.

At that time an average family with a dog team required at least 150 caribou every year for survival. Inuit probably harvested 16,500 caribou or more annually from the Kaminuriak population. The kill by Chipewyans, numbering about 130 families in the Kaminuriak population's range, was similar at about 19,500 per year. One estimate of the total kill by humans was 35,000 to 40,000 caribou per year between 1920 and 1945. This probably represented in excess of 20% of the caribou population each year. Forty to 50% of the kill was used for dog feed, an adjunct of the fur trade in which dogs were used for transportation.

Hunting patterns of Inuit and Dene groups were dramatically influenced by the appearance of trading posts in southern Keewatin and the northern provinces. The nomadic hunting group became a more or less permanent hunting camp and movement in the traditional tribal area was reduced. The restricted hunting and trapping mobility, coupled with a drastic decline in abundance of caribou, began to affect the viability of encampments.

The scarcity of caribou and increasing unpredictability of migrations were two major factors bringing about the centralization of Dene and Inuit into communities starting in the 1950s. By the mid-1950s most Chipewyans had moved into communities, with the exception of a few families who remained at camps at Misty and Maria Lakes in northern Manitoba. In 1963 the last Caribou Inuit had moved into town.

The consequence of centralization was a dramatic drop in the caribou harvest. It was probably around 30,000 during the early 1950s, then declined to about 10,000 by 1959-60, then to 5,000 through the 1970s and is now in the order of 8,000 or more, dependent on seasonal and movement patterns of sub-units making up the Kaminuriak caribou population. The proportions of the total kill taken by Dene and Inuit has changed over the years. Until the late 1960s the harvest was approximately equally divided between the two groups. When the herd shifted to use of tundra winter range in the mid-1970s, over 95% of the reported harvest was taken by Inuit. In 1982-83, when the herd began returning to Manitoba, Dene once again obtained a larger share of the harvest.

NWT communities hunting the Kaminuriak herd are: Baker Lake, Chesterfield Inlet, Arviat, Rankin Inlet, and Whale Cove. In Manitoba: Brochet, Lac Brochet, and Tadoule Lake. And in Saskatchewan: Wollaston Lake.

In 1987 a commercial quota of 350 was issued to the Keewatin Wildlife Federation, an Inuit organization based in Rankin Inlet.

Many water crossings in the Keewatin are protected areas.

RECENT STUDIES

Alarmed by indications of drastic population declines in barren-ground caribou on the mainland around mid-century, the Canadian Wildlife Service selected the Kaminuriak herd for intensive study, beginning in 1966 and ending in 1968. The resulting reports (four volumes entitled "Biology of the Kaminuriak Population of Barren-Ground Caribou") were published in the 1970s and represented the largest compendium of caribou information since the work of Banfield and Kelsall.

In the 1970s a proposal to route a pipeline through the Keewatin resulted in a number of studies to determine environmental impacts. Some of these were caribou studies conducted by the NWT Department of Renewable Resources and published under the federal government's Arctic Islands Pipeline Program (AIPP) report series. Other studies were commissioned by Polar Gas (the consortium of companies which proposed the pipeline).

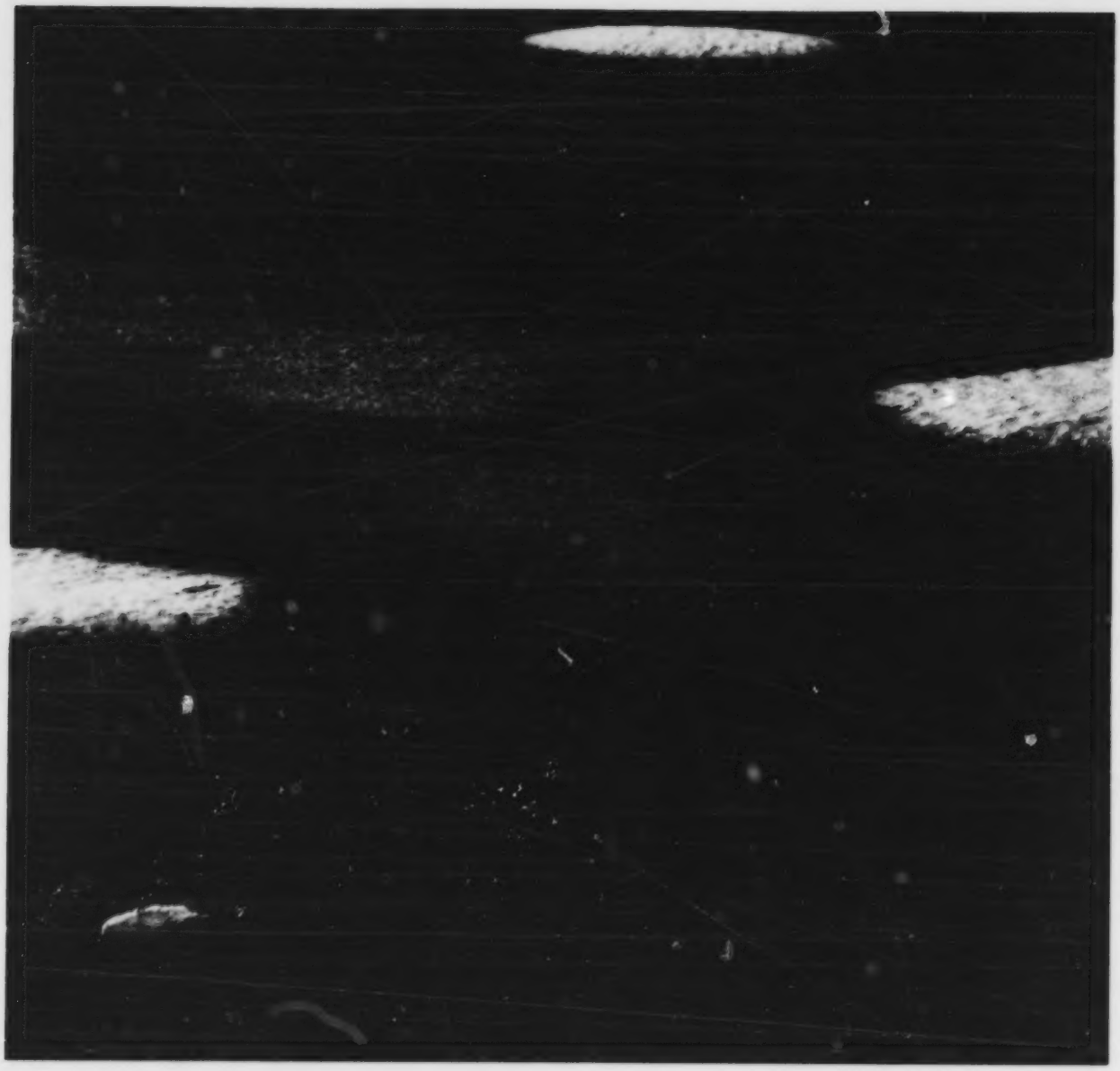
In 1978 the Caribou Protection Measures were enacted. They prohibit industrial activity in specific areas on the Beverly and Kaminuriak range when cows and calves are near. No one can work near a water crossing, or do anything that blocks or diverts caribou moving to or from calving areas. Movements of the two herds are monitored by aircraft each year from May to July as part of these Measures.

Another significant program which is routinely carried out for the Kaminuriak population is collection of harvest data. Since 1981 the Keewatin Wildlife Federation has gathered kill statistics on all species of wildlife hunted in the Keewatin. This information is collected each month by field workers through hunter interviews.

Spring composition surveys are done annually in March and April, and since 1983 both visual and photographic calving ground surveys have been conducted in June, usually every second or third year.

An important new study was begun in 1984 when radio collars were placed on caribou in the Keewatin. The purpose was to determine whether cows returned to the same calving area each year, or whether there was a significant movement of animals between herds. From November 1984 to October 1986, 62 Kaminuriak cows and 48 Wager Bay cows (belonging to a herd north of the Kaminuriak) were collared. As of June 1988, 97% of all cows had returned to the same calving grounds in subsequent years. Some examples of those which changed calving grounds are:

- two cows collared out of Arviat were found on the Beverly calving ground the following June
- one cow calved for three consecutive years at Kaminuriak Lake, then in the fourth year switched to the Beverly calving ground
- a cow collared north of Wager Bay in November 1985 was located in May 1986 on the Kaminuriak calving ground; thirteen days later it was found with a calf north of Wager Bay — 450 km distant



Bob Decker

Bulls crossing Lyon Inlet on Melville Peninsula.

NORTHEASTERN MAINLAND

BY MARK WILLIAMS

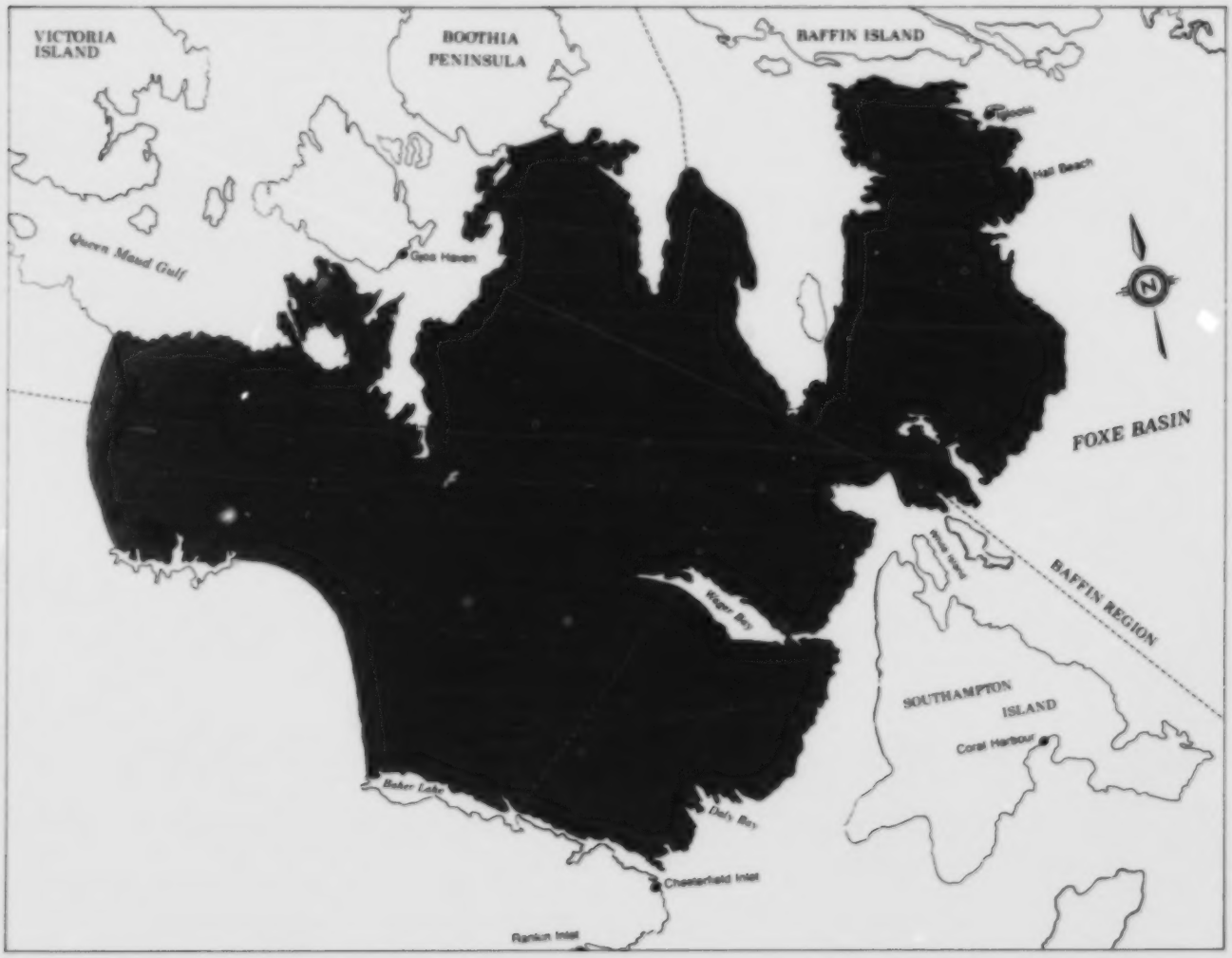
Relatively little is known about the barren-ground caribou occupying the northeastern portion of the NWT mainland. Most information suggests there are three populations — Wager, Melville, and Queen Maud. Movements from one to another probably occur, but the extent of them is unknown. There are also many accounts of large numbers of caribou migrating in both directions across Chesterfield Inlet, which suggests the possibility of caribou from this area intermingling with Kaminuriak caribou. The sudden increases in the Bathurst and Kaminuriak herds in the early 1980s may have been due in part to migration from populations in the northeastern mainland. There may also be a considerable interchange of caribou between Melville Peninsula and Baffin Island.

RANGE USE

Little is known about the annual distribution and movements of these caribou. All are believed to remain on the tundra year-round. Unlike the other mainland herds, caribou from this area have not been observed to form large post-calving groups, possibly due to the late emergence and low number of mosquitoes. Another difference is the greater number of yearlings remaining with their mothers after calving. In more southern herds the yearlings become separated from their mothers prior to or during the long spring migration from forested wintering areas to calving areas on the tundra.

POPULATION STATUS

Twelve surveys were conducted in this area in the 1970s and early 1980s. Three were calving ground surveys flown on Melville Peninsula during the years 1972-74. Five were conducted during 1975-77 stimulated



DISTRIBUTION OF CARIBOU ON THE NORTHEASTERN MAINLAND IN RECENT YEARS

by a pipeline proposal from Polar Gas, with those undertaken by the NWT Department of Renewable Resources being published under the federal government's Arctic Islands Pipeline Program (AIPP) report series. Four more surveys were conducted in the area during 1979-83.

Only the 1983 survey covered the entire region, including the previously uncensused area south of Queen Maud Gulf. It resulted in an estimate of 120,000 caribou divided among three areas of high density: on Melville Peninsula, north and south of Wager Bay, and south of Queen Maud Gulf. (Similar concentrations observed north and south of Wager Bay in 1976 were referred to as the Wager and Lorillard herds, respectively. However, it is unclear whether these animals compose one or two populations and in this chapter both are referred to as the Wager population.)

Based on the 1976 and 1983 surveys, the Wager and Melville populations appear to be stable or slowly increasing. With few wolves and modest hunting pressure, this trend should continue.

Within hours of birth a calf is on its feet, and in a day or two is able to keep up with the herd.

UTILIZATION

Caribou meat is the most important source of protein for the native residents of the eastern Kitikmeot and northern Keewatin regions. Ten Inuit communities hunt caribou from this area.

Gjoa Haven, Pelly Bay, and Repulse Bay hunt these caribou almost exclusively. Spence Bay hunts them too, but also takes caribou from Boothia Peninsula. Hunters from Igloolik take more of their caribou from Baffin Island than from Melville Peninsula, while the reverse is generally true for hunters from Hall Beach.

For Baker Lake and Chesterfield Inlet, the proportion of caribou taken from the Wager, Beverly, and Kaminuriak herds varies yearly with changing caribou distribution and density. In the first half of the 1980s, the proportion of caribou from the Wager population in the Baker Lake and Chesterfield Inlet harvest has varied from less than 1% to 50%, and 60% to 90%, respectively. In some years people from Coral Harbour and Rankin Inlet harvest some caribou from northeastern Keewatin.

In 1982 approximately 8,400 caribou were taken from the three populations. Commercial quotas, as of January 1987, were available as follows: Queen Maud 180, Wager 250, Melville 350.

RECENT STUDIES

Current research is trying to determine (a) whether cows on the northeastern mainland return to the same calving areas each year, and (b) the extent of interchange among the three populations, and between them and adjacent herds. To accomplish this, radio collars have been placed on Keewatin caribou. From November 1984 to October 1986, 62 Kaminuriak cows and 48 Wager cows were collared. It was found that most of these animals calved in the same area each year.

Southampton Island is the only place where a caribou transplant has been carried out in the Northwest Territories.

NORTHERN HUDSON BAY

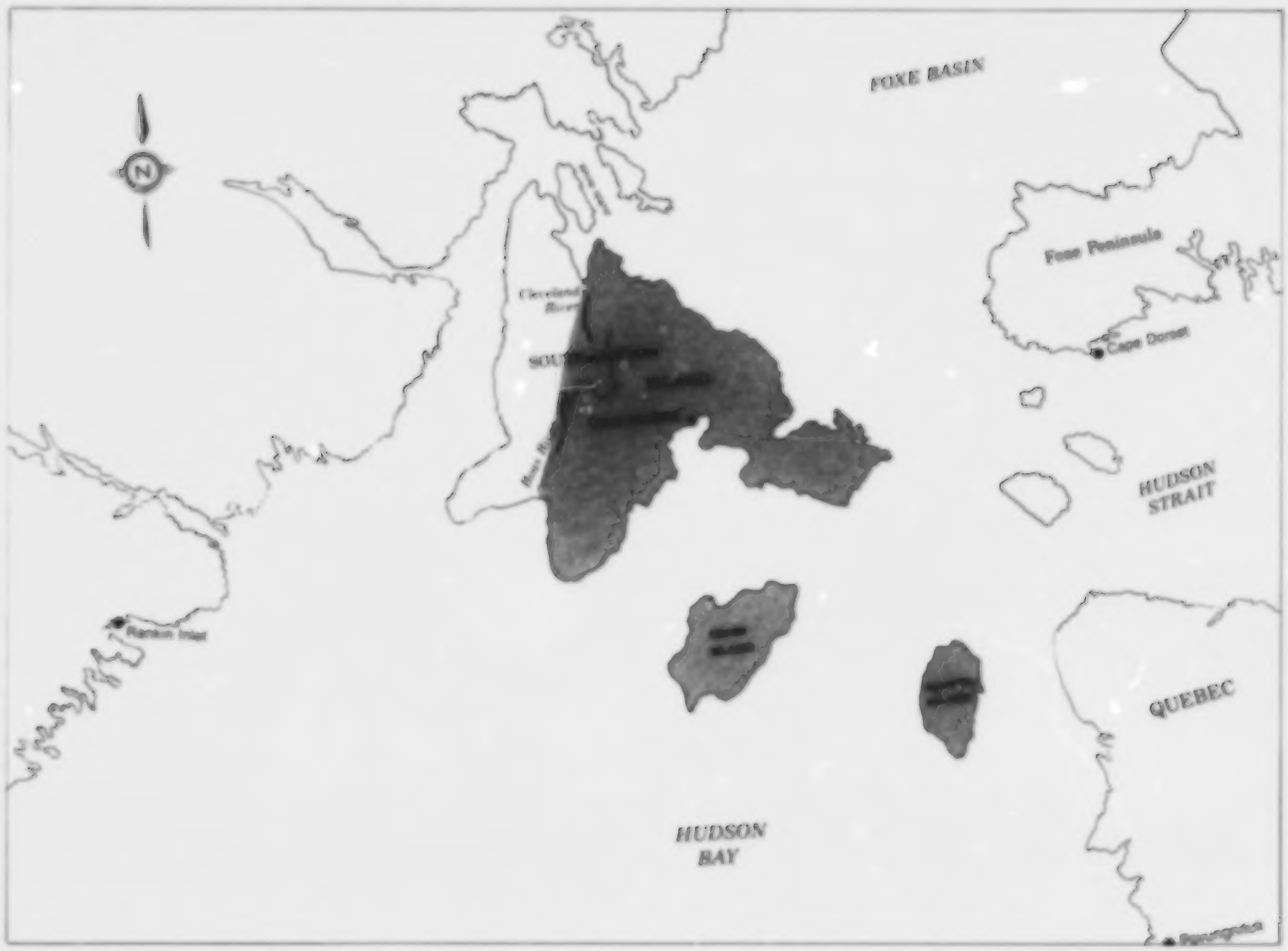
BY BOB DECKER

Barren-ground caribou presently inhabit the three major islands that lie in northern Hudson Bay, but only Southampton and Coats, the two largest islands, support substantial populations.

There is little in the way of historical information on these caribou. On Southampton and Coats, they were utilized by the resident Inuit (Sadlermiut), a coastal people who relied principally on marine mammals, and by whalers, who began operating in earnest in the area in the late 1800s. At the turn of the century the Sadlermiut died out, presumably due to disease contracted from the whalers, and whaling itself declined. In the early 1900s, following a period of little or no harvest, caribou on the two islands were apparently abundant.

In 1919 the Hudson's Bay Company established a trading post on Coats Island. New Inuit residents from southern Baffin Island (Okomiut) were moved to the island to trap arctic fox. The activities of the island's new inhabitants took their toll on the caribou population. By 1924, the year the trading post and all the human inhabitants relocated to Coral Harbour on neighbouring Southampton Island, the caribou population of Coats Island had declined drastically.

The closing of the Hudson's Bay post on Coats Island and its re-establishment at Coral Harbour certainly had an effect on the caribou of Southampton Island. The Okomiut from Coats Island joined the other Inuit residents of Southampton Island (the Aivilingmiut, who had been brought to the island some years earlier from the nearby mainland by the whalers). Increased hunting activity that coincided with the introduction to the island of a readily available supply of modern firearms and ammunition, quickly reduced the island's caribou population to the extent that by 1930, the local Inuit were having difficulty securing enough caribou for clothing.



DISTRIBUTION OF CARIBOU ON SOUTHAMPTON, COATS, AND MANSEL ISLANDS IN RECENT YEARS

LEGEND

Distribution of caribou

Community

By the late 1930s, the few caribou that remained were confined mainly to White Island (immediately off the northeast end of Southampton) and the rugged uplands of the eastern coast. Occasionally small groups would wander down from the hills, but these were promptly shot. Following the drastic decline of the Southampton Island caribou, Inuit hunters from Coral Harbour would periodically visit Coats Island by whaleboat in late summer and early fall for the purpose of securing as many caribou as possible, mainly to augment their supply of skins for clothing. By 1950, caribou on Southampton Island were reported to be nearing extinction. They became extinct on the island in 1957 when the last caribou was shot.

Caribou were re-introduced to Southampton Island in June 1967 by the Canadian Wildlife Service and the territorial Game Management Service. Forty-eight caribou, captured and airlifted from Coats Island, were successfully released near Coral Harbour. While the re-introduced caribou on Southampton Island have done exceedingly well, caribou on Coats Island have suffered at least two serious declines in the 1970s and 1980s. Recent studies show that food availability has been a major factor in the difference in health between the two populations.

SOUTHAMPTON ISLAND

Southampton Island caribou do not appear to undertake significant seasonal movements, although in winter they tend to gather in coastal areas while in summer many move farther inland. This pattern appears to be a reversal of what was reported for the original population, which was said to winter in the eastern uplands and summer mainly on the coastal lowlands. The ranges presently used encompass more than half the island with most caribou found throughout that portion of the island that lies east of the Boas River. Small numbers are also found along the western edge of the uplands as far north as the mouth of the Cleveland River.

Since their re-introduction in 1967, Southampton Island caribou have rapidly increased in number. Growth rates for this population (about 26% per year) appear to be close to the maximum for caribou. Two aerial census surveys of the Southampton Island caribou population have been conducted. The first, carried out in November 1978, estimated 800 - 1,500 caribou on the island. The second, carried out in June 1987, estimated the island's caribou population at 3,400 - 4,700. Range studies undertaken during 1970-72 indicated that the island could support up to 40,000 caribou, and that winter range would ultimately be the limiting factor in the growth of this population (unless a wolf population becomes established).

Predation is currently not a significant mortality factor in this caribou population, as wolves are either absent or exceedingly rare. This was not always the case. In the early 1900s wolves were apparently common throughout much of the island. As caribou declined, so did wolves. By 1937, wolves disappeared from the island. Wolves did not reappear on Southampton Island until 1980 when one wolf was shot and the tracks of others observed. With the present rapid growth and expansion of the local caribou population, it is highly probable that more wolves will immigrate to the island. However, an increase in wolves will also bring about an increase in wolf hunting, which may prevent them from becoming sufficiently established to have an appreciable effect on the caribou population.

There is presently little human utilization of this caribou population. For ten years following their re-introduction to the island, caribou were protected from hunting. In 1978 Inuit residents from the community of Coral Harbour were permitted a quota of 25 males. By 1988 this had been increased to 300 males.

COATS ISLAND

Coats Island caribou, like their counterparts on Southampton Island, do not undertake significant seasonal movements. In summer they may be found anywhere on the island, though most prefer the relatively well-vegetated lowlands in the southern half of the island. In winter, especially later in the season, they favour wind-swept areas, most often raised beaches along the coast, where the absence of snow or thin snow cover allows them to forage more easily. These areas are particularly critical during those occasional winters when unusually deep hard-packed snow prevents caribou from feeding at other sites. Caribou make little or no use in winter of the largely barren and interior uplands. Throughout much of the year female caribou appear to be concentrated on the southern half of the island, particularly along the coast. It is quite probable that most calving activity takes place in this area. Inuit hunters have indicated that bulls are more common on the northern end of the island.

During the four decades that followed the closing of the Hudson's Bay Company trading post on Coats Island in 1924, the status of the island's caribou population was virtually unknown. Census surveys carried out since then have shown the population to be relatively unstable. In 1961,

The rugged uplands on the east side of Southampton Island are prime caribou habitat.

the first aerial survey was carried out and yielded an estimate of 500-600 caribou. Subsequent surveys indicated a rapid growth that peaked at over 6,000 caribou by 1974. During the winter of 1974-75, unusually severe snow conditions reduced forage availability and resulted in the starvation deaths of over 70% of the population. In the winter of 1979-80, the population experienced a similar although not nearly as catastrophic decline. Some mortality occurred during the winter of 1983-84. The most recent census survey, carried out in early July 1984, estimated the Coats Island caribou population at 2,100.

Intensive studies on Coats Island caribou carried out jointly by the NWT Department of Renewable Resources and the University of Alberta in the early 1980s have provided much insight into the ecology of these island caribou. Unlike the mainland populations of barren-ground caribou, which are usually found in large groups throughout much of the year, Coats Island caribou were found to be more solitary, particularly during winter. It has been speculated that the lack of gregarious behaviour of these island caribou is likely due to a variety of factors. Coats Island caribou subsist on range poor in lichens, a forage which is particularly important in the winter diet of mainland caribou. In winter, the poor quality and scattered distribution of the available forage on Coats Island results in small caribou group sizes. Group sizes on Coats Island also tend to be small during summer. On the mainland, the largest aggregations of caribou occur during summer. This behaviour is believed to be a mechanism by which caribou reduce the vulnerability of young calves to wolf predation. Insect harassment may also be a stimulus for the formation of these summer aggregations. On Coats Island these factors are absent or reduced as there are presently no wolves on the island, and the numbers of biting and sucking insects are much lower than on the mainland due to the cooling effect of the ocean on the island's summer climate.

In late summer and fall, Coats Island caribou were found to be in excellent condition, exceeding that of their counterparts on the mainland. However, by late winter their condition was very poor with animals using up most if not all of their fat reserves and in extreme cases using large percentages of muscle tissue. Winter nutrition is believed to be the main factor determining the reproductive

success of this population. Low calf production following harsh winters has been documented in a number of instances. The Coats Island caribou population, although subject to high mortality during periodic severe winters, has a high reproductive potential. It therefore has the capacity to recover quickly following years when environmental conditions are favourable for calf production. This high reproductive potential is due mainly to the unusually large proportion of females (over 80%) in the population. Lack of predators (wolves) on the island also helps to ensure calf survival. Conditions for population growth were favourable between 1976 and 1978 when the herd increased from 900 to 3,600 animals.

Coral Harbour is presently the only community that harvests Coats Island caribou. Prior to 1978, when a small quota for Southampton Island was established, Coats Island had been the only source of caribou available to Coral Harbour residents for many years. Hunting of Coats Island caribou has been regulated since 1970 when a quota of 80 animals was established. The quota was subsequently raised to 120 in 1971 and then 300 in 1973. At present the quota remains at 300. Only in recent years has the actual harvest approached this figure. For a short period of time in the early 1970s, some caribou were harvested by the few Inuit from Coral Harbour who wintered on the island to trap fox. In the last decade, other than a few animals collected for scientific purposes, all hunting activity has occurred during late summer and early fall, the only time of year when access by boat from Coral Harbour is possible. Bulls form the bulk of the harvest as they are in the best condition and predominate at that time of the year at the north end of the island, the area where most hunting takes place. The high proportion of bulls in the harvest is believed to be the major factor causing the skewed sex ratio of caribou on Coats Island.

MANSEL ISLAND

The status of caribou on Mansel Island, an island that has no permanent human inhabitants, is largely unknown. In recent years, the few observations of caribou on the island have been recorded during infrequent wildlife surveys, none of which have been specifically for caribou. In March 1978, the NWT Department of Renewable Resources conducted a polar bear denning survey by snowmobile on the island. During the course of the survey, three sets of caribou tracks were observed. In August 1977 and 1978, the Quebec Wildlife Service, while conducting intensive aerial polar bear censuses of the island, observed a single bull and seven caribou, respectively. In July 1984, during the course of a general wildlife reconnaissance flight carried out by Renewable Resources that covered most of the immediate coastal area of the island, two caribou were recorded.

The scarcity of caribou on Mansel Island is somewhat surprising as it appears biophysically to be very similar to neighbouring Coats Island, which supports a substantial caribou population. Habitat types utilized by Coats Island caribou, both in winter and summer, are in good supply on Mansel Island. It is possible that the island has the potential to support caribou at densities similar to Coats Island. The present low numbers of caribou on Mansel Island may involve one or a combination of factors. The occasional harvests of the island's caribou by residents from northern Quebec, usually during polar bear hunting forays to Mansel Island, may have been too excessive for this small population. Ice conditions and/or low caribou numbers at times in neighbouring areas may severely restrict opportunities for immigration of caribou to the island. Mansel Island is almost certainly, and perhaps more so, prone to the same kind of adverse winter conditions which have periodically decimated the Coats Island caribou population.

Rob Docker

Steep cliffs and fiords hamper caribou studies on Baffin Island.

BAFFIN ISLAND

BY MIKE FERGUSON

Caribou populations on the mainland of the NWT have been studied extensively since the late 1940s. Unfortunately, less effort has been devoted to Baffin caribou because of the difficulties in studying them and because of their supposedly low numbers.

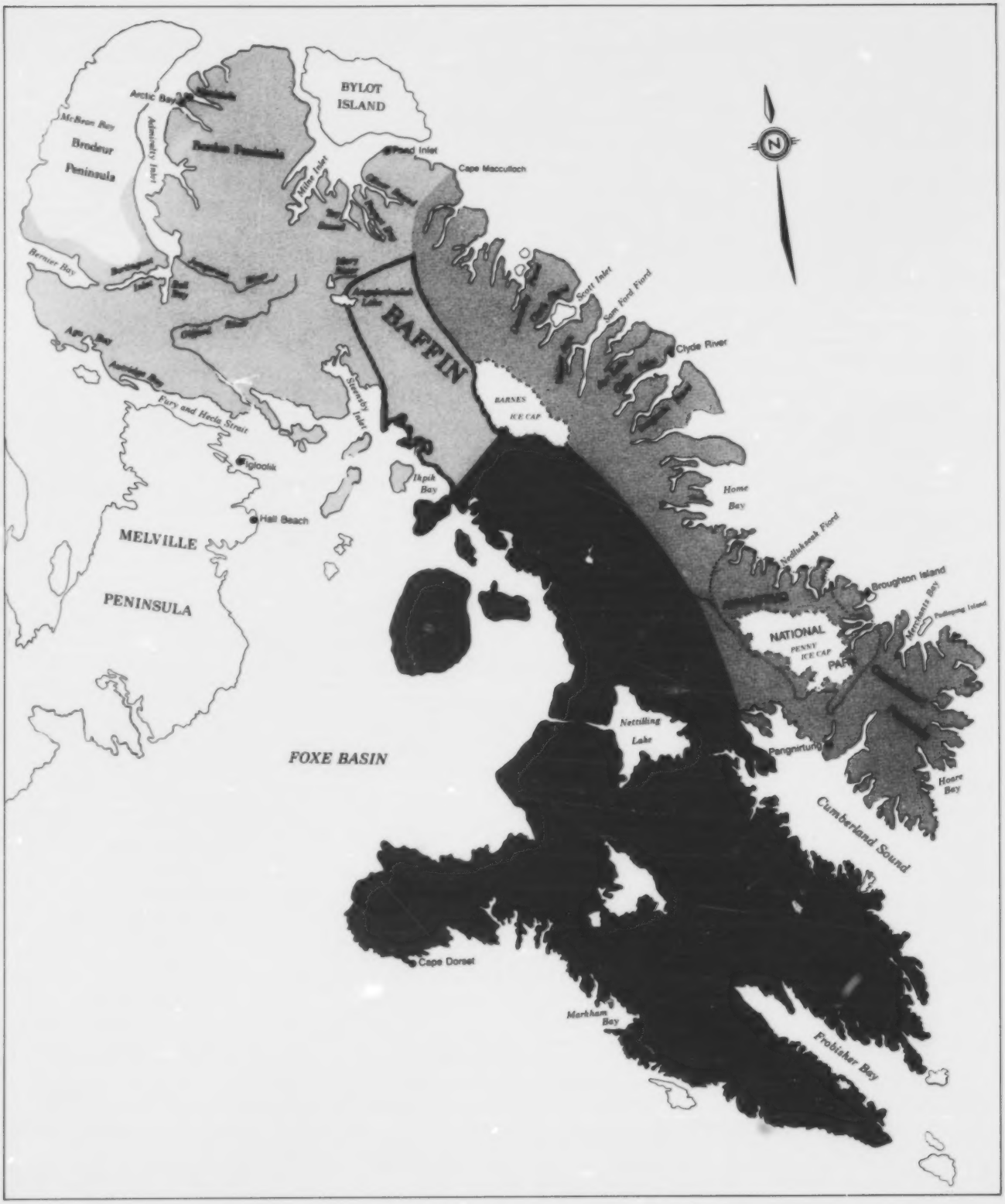
From 1949 to 1972, four aerial surveys attempted to cover all of Baffin Island, but the resulting population estimates were unreliable for a variety of reasons. After this early work, it was realized that an adequate survey of the entire island was impossible. Nevertheless, most subsequent aerial surveys have continued to be plagued with problems, even though they have been confined to smaller areas.

Most importantly, the indiscriminate use of the early estimates continues to give the impression that there is a relatively small, unimportant population of caribou on Baffin Island. Even in the 1980s the number of caribou on Baffin Island has been reported as decreasing from a 1974 estimate of only 20,000. Yet this estimate came from an unreliable survey which covered only a portion of the South Baffin caribou range, and the "decrease" was reported without sufficient supporting data.

Because of the lack of reliable estimates over a number of years, population trends cannot be described with certainty. Evidence collected from Inuit hunters suggests that caribou distribution has expanded and contracted on Baffin in the past. Occupied range was large in the 1920s, small in the 1940s, and now seems to be expanding again on much of the island. Population numbers appear to have increased since the 1960s, though lack of data makes this impossible to prove. Movement of caribou from one range to another, or lower densities over a larger area, may also explain some of the changes.

The logistical problems of surveying Baffin caribou centre around the

Barren-Ground Caribou



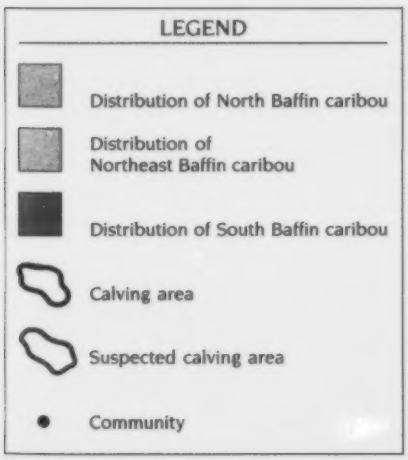
rugged terrain, uncertain spring weather, and dispersed calving areas, which make traditional calving ground surveys difficult. June weather in the vicinity of the major Baffin calving areas is notoriously bad.

Most caribou survey techniques have been developed for the mainland and are difficult to apply on much of Baffin. On the mainland a typical calving ground survey estimates the number of breeding females on the calving grounds. This requires that all breeding females in the population use the same calving ground every year, and that the boundaries of that calving ground are well known. If these requirements are met, the surveys do not have to cover the entire range of the caribou population. However, not all caribou populations on Baffin undertake long migrations to specific calving grounds. In June some caribou calve on or near their wintering areas. Because calving is dispersed, Baffin caribou are not divided into distinct calving "herds." Baffin caribou "populations" are tentatively based on distinct breeding areas where animals are concentrated in the fall.

Mainly as a result of tagging studies begun in 1974, it has become clear that at least two caribou populations exist — one on southern and one on northern Baffin Island. Other evidence, mainly from Inuit hunters, suggests that a third population occupies the fiords and their headwaters along northeastern Baffin. Smaller groups or sub-populations have also been identified. Most study efforts have been directed at the South Baffin population, because it is utilized by about 70% of Baffin's human population.

In fall 1984 and 1985, surveys were conducted to count breeding South Baffin caribou as part of a three-year study. The 1984 survey was successful, except that high elevations could not be covered due to low cloud. The 1985 survey was cut off after rain produced patchy snow cover and caribou distributions appeared abnormal. After considerable reassessment, it was decided that the distribution and seasonal movements of South Baffin caribou were not adequately described by tag returns. Therefore, tagging and aerial surveys have been replaced by a telemetry study. About 10 South Baffin caribou will be collared with satellite radio transmitters in each of five years.

DISTRIBUTION OF BAFFIN CARIBOU IN RECENT YEARS



SOUTH BAFFIN

MIGRATORY CARIBOU

The calving grounds of migratory caribou of southern Baffin Island were first studied during 1966-70 in the area of Baird Peninsula and Dewar Lakes in west central Baffin. Cows and yearlings apparently begin arriving there from the south in late April. Most calving takes place on high rugged plateaus east of Dewar Lakes during the middle two weeks of June. Some calving also occurs on the coastal plains of Baird Peninsula. Cows, calves, and yearlings then move west and south towards Foxe Basin, where they summer on the coastal plains. During July the caribou are usually dispersed over the Great Plain of the Koukdjuak in groups of 25-100 individuals, though occasionally groups numbering in the thousands have been reported.

By mid-July caribou begin arriving in numbers at the Koukdjuak River, which they must swim to continue their southward journey. The river is 5 km wide in places, and ice from Nettilling Lake may be present as late as early August. Each year an unknown but probably small number of caribou die in the attempt to cross the Koukdjuak. Most are calves and old females.

After crossing the river, the caribou continue southward across the lush Great Plain of the Koukdjuak, which they share with waterfowl, particularly snow geese. Some bulls cross the Koukdjuak later than most cows and calves, but many do not undertake the long migration; they remain on the southern wintering range or just north of it during summer.

Caribou also migrate south along the east side of Nettilling Lake,

through the swarm of islands in Camsell Bay, arriving there later than on the west side — usually in mid-August.

Migratory caribou are now known to winter in at least three areas: on Foxe Peninsula, between Frobisher Bay and Amadjuak Lake, and between Nettilling Lake and Cumberland Sound. During winter, the Great Plain of the Koukdjuak is devoid of caribou.

This information was obtained through a tagging project on the Koukdjuak River from 1974 to 1982, where a total of 3,111 caribou were tagged. Caribou, mainly cows, calves, and yearlings, were tagged as they swam across the river from mid-July to late August.

Tag returns from hunters indicate areas where hunting and caribou winter range overlap. More than half of the returned Koukdjuak tags have come from Cape Dorset hunters. This suggests that most caribou proceed south from the Koukdjuak River to winter on Foxe Peninsula. The present use of Foxe Peninsula by wintering caribou represents a dramatic change from the 1930s, '40s and '50s when few caribou were present there. Most other tags are returned by Iqaluit and Pangnirtung hunters. A few tags have been returned by hunters from Broughton Island and Lake Harbour. One tag was returned by an Igloolik hunter who was hunting on the calving ground in August.

In 1982, which was the last year for tagging caribou on the Koukdjuak River, a new tagging operation began in Camsell Bay on the east side of Nettilling Lake. By September 1986 almost 3,000 caribou had been tagged in Camsell Bay.

Most of the caribou which migrate through Camsell Bay apparently winter just southeast of Nettilling Lake. Pangnirtung hunters have returned most of the tags coming from these caribou. A few of the returned Camsell Bay tags have come from Iqaluit and Cape Dorset hunters.

In March the spring migration northward commences, with pregnant cows and calves leading the way. Although migratory routes are poorly known, caribou from north of Frobisher Bay, and east of Nettilling and Amadjuak Lakes, apparently migrate northward across Camsell Bay. The caribou from Foxe Peninsula probably move north along the west shores of Amadjuak and Nettilling Lakes, avoiding the plains along the Foxe Basin coast.

A number of incomplete aerial surveys were flown between 1974 and 1985. The fall 1984 survey produced an estimate of about 44,000 caribou for Foxe Peninsula and areas north of Markham and Frobisher Bays. The vast majority of these caribou (34,000) were on Foxe Peninsula. This is not an estimate for all South Baffin migratory caribou, and probably includes resident caribou in these areas. Migratory caribou probably winter in areas where harvesting rarely occurs. On the other hand, South Baffin migratory caribou apparently do not occur on Hall and southern Meta Incognita Peninsulas since hunters have never returned tags from these areas.

RESIDENT CARIBOU

Some caribou reside year-round on southern Baffin Island, especially on Hall, Meta Incognita, and Foxe Peninsulas. In early to mid-June on Hall Peninsula, caribou give birth to calves at high elevations in the mountains along the eastern coast, as well as in other areas. Individual cows, or cows in small groups, then move down steep mountain slopes with their calves, and groups congregate in snow-free valley bottoms by late June.

Caribou may also calve on Meta Incognita Peninsula. Pregnant cows are sometimes harvested on the peninsula in late winter. In the 1920s Inuit reported that caribou migrated from the vicinity of Grinnell Glacier and calved near Mingo Lake. These movements may still occur, but this area has not been visited for many years.

In 1979 Inuit from Cape Dorset discovered a calving area on western Foxe Peninsula, and in mid-July 1984

Part of the South Baffin migratory population crosses the Koukdjuak River, which is 5 km wide in places.

an aerial reconnaissance revealed large numbers of caribou with calves on the northern coast of the peninsula. Previously it was thought that only migratory caribou occurred on Foxe Peninsula.

During the fall rutting season, groups of male and female caribou are found near the coast in river valleys or in other low-lying areas on the southern peninsulas. In late winter, caribou on Hall and Meta Incognita Peninsulas are usually found at higher elevations, but not usually on the highest interior plateaus and mountains (those greater than 600 m above sea level). In March 1982, the only survey of northern Meta Incognita found a concentration of caribou northeast of Markham Bay, but very few east and south of Lake Harbour. In winter of 1984-85 after freezing rain in the fall and a thaw in January, Inuit reported that caribou on Meta Incognita used lower elevations than usual. However, in recent years hunters have found caribou in increasing numbers southeast of Lake Harbour. Lake Harbour is the only community which hunts caribou on Meta Incognita.

Hall Peninsula was surveyed in 1978, 1979, and 1982. The latter resulted in an estimate of 3,500 caribou. The area is hunted in both summer and winter by residents of Iqaluit, though the majority of caribou taken by them comes from the South Baffin migratory population.

NORTH BAFFIN

The population boundaries of North Baffin caribou are not precisely known. Generally, they take in the northwestern portion of the island. Within this area, caribou do not now occupy Bylot Island and northern Borden Peninsula, but have in the past.

In the early 1980s two surveys were attempted but results were inconclusive. Residents of Arctic Bay, Igloolik, and Pond Inlet have provided most of our knowledge of North Baffin caribou. They report a gradual expansion of caribou distribution northward on Borden Peninsula since the 1960s. Although caribou use southern Brodeur Peninsula near Bernier Bay and Berlinguet Inlet, Inuit have rarely seen caribou on the remainder of

In summer, caribou moult their winter coats and grow new ones.

Brodeur. Caribou were seen on Brodeur in the winter of 1984-85 north of McBean Bay on the west coast, and on southeastern Brodeur in the summer of 1987.

The North Baffin population probably consists of two or more subpopulations, similar to the migratory and resident caribou of southern Baffin. Many North Baffin caribou may use common calving areas north of Steensby Inlet. During May, females and young males migrate from Tay Sound, Paquet Bay, and Milne Inlet southward through the Mary River valley, while bulls remain behind during summer. Many caribou apparently calve in rough terrain east of Angajurjualuk Lake. Calves are usually seen on hillsides and in small valleys. Whether these caribou return north in summer, or move onto the lowlands of Steensby Inlet is not certain. Caribou are also scattered south of Oliver Sound during summer. During winter, caribou concentrate in valley bottoms south of Tay Sound, Paquet Bay, and Milne Inlet. The people of Pond Inlet hunt caribou in these areas year round. In summer they take mainly mature males, which do not migrate inland.

Arctic Bay residents usually harvest caribou south and east of Admiralty Inlet. In spring, caribou from southern Admiralty Inlet, Bell Bay, and Jungersen River migrate eastward, probably to the calving areas north of Steensby Inlet. From late winter until fall, mainly bulls and non-productive females are found near southern Admiralty Inlet and on southern Borden Peninsula. Cows and calves gradually return to these areas during summer and fall to spend the winter.

Igloolik residents often harvest up to 80% of their caribou from Baffin Island. Their hunting areas extend from north of Agu Bay east and south to the Baird Peninsula. Caribou are found in these areas during much of the year. In spring, caribou migrate from the Gifford River area to the calving areas north and east of Steensby Inlet. The coastal plains of Steensby Inlet appear to be well-used summering range.

Igloolik hunters report that in spring some caribou migrate from northeast of Steensby Inlet to calve

A young caribou from the North Baffin population.

along the coast of Ikpik Bay and on Baird Peninsula, and then return in the fall. This possible overlap of calving grounds does not disallow distinguishing between the two populations, as long as each returns annually to distinct rutting areas in the fall.

There are also other movements and smaller calving areas. Inuit report that calving occurs north of Agu Bay, Autridge Bay, and Fury and Hecla Strait. Other small calving areas are also likely. As well, caribou move between Melville Peninsula and Baffin Island across Fury and Hecla Strait.

Hall Beach residents sometimes harvest North Baffin caribou, although they mainly take caribou from northern Melville Peninsula on the mainland.

NORTHEAST BAFFIN

Although poorly known, the boundaries of this population are believed to encompass the mountains and fiords extending from southeastern Cumberland Peninsula to Cape Macculloch. No large, common calving or breeding areas are known within these boundaries. Therefore, the region may actually hold a number of relatively isolated sub-populations within various fiord systems. The movement of caribou between some areas may be restricted by precipitous cliffs, which rise up to 1,500 m from the fiord bottoms, and extensive icefields, especially around Penny Ice Cap on Cumberland Peninsula.

Since aerial surveys have never been conducted in this region, knowledge of caribou range comes from Inuit hunters. Considerable information exists for the hunting areas of Clyde River and Broughton Island. Hunters usually use only certain areas where sufficient numbers of caribou are found close to settlements or outpost camps. Thus, little recent information exists for more distant, inland areas.

Before the early 1960s, caribou were locally abundant on Cumberland Peninsula, especially between Merchants Bay and Hoare Bay. During the 1960s, they declined, possibly due to overhunting, poor range, or severe snow conditions. At about that time, residents moved from Padloping

There are still many mysteries about Baffin caribou.

Island to Broughton Island. Since then, Pangnirtung people have concentrated their hunting efforts on the South Baffin migratory caribou between Nettilling Lake and Cumberland Sound. Broughton Island people sometimes hunt the southern Isurtuq watershed, north of Nettilling Lake where they take South Baffin caribou in late winter. Some hunters have suggested that caribou on Cumberland Peninsula may have increased in recent years, but the current status and location of these caribou remain mysteries.

In the Broughton Island area, caribou occupy river valleys at the heads of Nedlukseak and other fiords north of Penny Ice Cap in Auyuittuq National Park. Hunting in these areas usually occurs during June when the caribou move into the valleys to calve. The wintering areas of caribou which calve in Nedlukseak and other fiords is not exactly known, although it may be in the northern reaches of the Isurtuq River or adjacent to the Penny Ice Cap.

Inuit hunt in the Home Bay area infrequently and thus caribou distributions in that area are poorly known.

Mainly during winter, residents of Clyde River harvest caribou to the south in the river valleys of Clyde Inlet and Inugsuin Fiords. To the north, they hunt in the Ayr Lake valley, and along Sam Ford Fiord, Walker Arm, Scott Inlet, Clark Fiord, and Dexterity Fiord. Caribou in these hunting areas are usually found only in small numbers. Caribou also occupy the highlands east of Barnes Ice Cap, although hunters infrequently travel that far inland.

Clyde River hunters recognize two kinds of caribou within their hunting areas. *Tuktu* is larger, has thicker antlers, and is found in coastal areas. The smaller, skinnier *qungniq* is found farthest inland, and has paler fur and eyelashes. *Qungniq* apparently has a milder taste, "like rabbit meat." Specimens and measurements collected from Clyde Inlet and Scott Inlet caribou may document some of these differences. Some differences may reflect different qualities of range in different areas.

In the past, caribou were common along the coast between Home Bay and Dexterity Fiord. Hunters now report that caribou are not as common there as they once were. As with the decline of caribou on Cumberland Peninsula, it is not known with certainty why these changes have occurred. The reduction in occupied caribou range on northeast Baffin contrasts dramatically with the recent expansions on south and north Baffin.

UTILIZATION

The importance of caribou to the Inuit of Baffin has varied with family group, hunting area, and availability of caribou. During the mid-1900s, some Cape Dorset families searching for caribou undertook annual treks of 600-800 km in one year. In some years, a family may have found an area with many caribou. But on a subsequent trip they may not have found enough caribou and their return was a race against starvation. In years of caribou scarcity, many families remained on the coast depending on marine mammals almost exclusively. Because of the scarcity of caribou in the 1940s, the Pangnirtung RCMP imposed an annual limit of only five caribou per family to be taken in summer. As well, they told two families who depended on the caribou and freshwater seals of Nettilling Lake that they could no longer live there. Today, caribou is an important element in the diet of all Baffin communities.

From 1980 to 1984 the Baffin Region Inuit Association collected data from Inuit hunters about the numbers of animals they harvested. Their estimates suggest an annual harvest of 6,000 - 8,000 South Baffin caribou, 5,000 - 7,000 North Baffin caribou, and about 1,000 Northeast Baffin caribou. The harvest by resident non-natives accounts for a small proportion of the total harvest with only about 100 caribou taken annually. If these caribou were replaced by beef at northern prices, the cost would amount to about $11 million annually.

But the assignment of a replacement value is an exercise which gives no weight to the traditional cultural values that Inuit place on being a caribou hunter. Although the mode of hunting has changed with snowmobiles, rifles, and Coleman stoves, there remain the personal pride and fulfillment gained from providing for one's family and sharing with others in the way of one's forefathers. As a part-time hunter, Pauloosie Kilabuk of Iqaluit expressed it this way: "I don't hunt just for me. I hunt for other people. I go out and get a caribou and I feel good about myself. It keeps me close to the men I hunt with. I make my parents, kids, relatives, and friends happy because they don't have caribou sometimes, and we all come together and share the meat. Caribou is more important than seal to keep my family and community together. With a caribou you can get four or five families together. What is a community feast without caribou?"

The loss of hunting skills among young Inuit is a concern of the elders. The wage economy holds little hope of full employment for the rapidly expanding population. At the same time, low sealskin and ivory prices have made it nearly impossible for full-time hunters to purchase supplies and equipment. As a result, hunters often sit idle, unable to provide caribou, seal, and muktuk for their families through their chosen lifestyle.

Commercial quotas, which allow hunters to sell caribou meat through retail outlets, make it possible for settlements with few caribou nearby (e.g. Broughton Island) to purchase meat from settlements where caribou are more common. Commercial quotas were first implemented during 1985-86 with 100 males to be taken from North Baffin, and 400 males and 100 females from South Baffin. Baffin hunters are aware of the need for careful management of such harvesting. As well, they have supported new studies of the movements, diseases, and physical and reproductive condition of Baffin caribou.

The Porcupine herd is composed of Grant's caribou (Rangifer tarandus grantii).

PORCUPINE HERD

BY DOUG URQUHART

From a small hotspring high in the Ogilvie Mountains, a river known to the Loucheux as Ch'oodeen-jik or Porcupine Quill River, begins its westward flow across the north Yukon to Alaska. In 1844, John Bell, a Hudson's Bay Company trader from Fort McPherson, descended this river which he called "The Porcupine" and at its mouth discovered the Yukon River. At the junction of these two rivers he later established Fort Yukon, Britain's westernmost trading post in North America.

Porcupine caribou take their name from this famous hunting and trading route which drains the heartland of their range and has always featured so greatly in the history of this herd. Although simply called "the Porcupine herd" among northerners, elsewhere it is carefully referred to as "the Porcupine caribou herd" because otherwise outsiders tend to confuse it with a herd of porcupines.

Another source of confusion is that although the Porcupine herd and other herds further west are technically Grant's caribou, they nevertheless are commonly called "barren-ground caribou" — a term that strictly speaking should be confined to the true barren-ground herds of the NWT mainland and Baffin Island. The scientific distinction between caribou subspecies is taxonomic — that is, based on anatomical differences. In this case, Grant's caribou are somewhat larger and darker than barren-ground caribou. However, breeding behaviour and seasonal movements of the two subspecies are very similar.

RANGE USE

The Porcupine herd is the only major international caribou herd in North America. Its total documented range extends from the Richardson and northern Mackenzie Mountains in

Prudhoe Bay
BEAUFORT SEA
ALASKA
Kaktovik
Canning River
Sagavanirktok River
BRITISH MOUNTAINS
SLOPE
ARCTIC NATIONAL WILDLIFE REFUGE
Arctic Village
Chandalar River
Tuktoyaktuk
Inuvik
Aklavik
RICHARDSON
Old Crow
Porcupine River
Yukon River
Fort Yukon
Fort McPherson
Arctic Red River
Mackenzie River
Circle
YUKON TERRITORY
EAGLE PLAINS
HIGHWAY
DEMPSTER
MOUNTAINS
Fairbanks
NORTHWEST TERRITORIES
Ogilvie River
Eagle
OGILVIE
Hart River
MACKENZIE
MOUNTAINS
Dawson
MOUNTAINS
N

the NWT, across the entire north Yukon Territory and into Alaska almost to Fairbanks in the south and Prudhoe Bay in the north. Most of this area seems to be occupied quite regularly by varying numbers of caribou — the only portion that receives infrequent visits being the Alaska winter range south of the Yukon River. Thus, at present, the Porcupine herd occupies virtually its entire known range which overlaps with two woodland herds in the Yukon and two other *granti* herds in Alaska.

Although some caribou may be seen anywhere on the Porcupine range during winter, most are found in three major areas: the Chandalar winter range above the Yukon and Porcupine Rivers in Alaska, the Ogilvie winter range including Eagle Plains plus the Ogilvie and Hart River basins in the Yukon, and the Richardson winter range consisting mainly of the Richardson Mountains along the Yukon-NWT border.

Porcupine caribou cows may begin to drift northward as early as January but the spring migration does not really get underway until April or May when spring thaws reduce snow depths enough to permit steady travelling. From the pattern of spring migration trails over the years, three general routes are apparent: the Chandalar route from the Chandalar winter range, the Old Crow route from the Ogilvie winter range, and the Richardson route from the Richardson winter range.

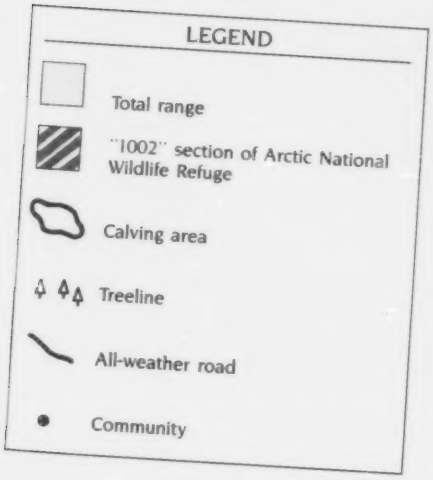
The calving grounds of the Porcupine herd is a strip of coastal plain bordering the Beaufort Sea with the foothills of the British Mountains along the south side. Although the entire calving grounds extend from the Mackenzie River in the NWT to the Canning River in Alaska, the majority of calving has most often occurred in the upper Jago River watershed in Alaska and in a second region straddling the Yukon-Alaska border. Even when most of the herd does not calve in the Alaskan core areas, it always convenes there sometime later — nobody knows why. However, a study conducted between 1983 and 1985 found that calf mortality was six times lower in the one summer (1984) when the caribou remained on the coastal plain than in the other two summers when the herd moved into the foothills where there are more wolves and grizzlies. This post-calving "sanctuary" on the coastal plain is blanketed by a potentially oil rich portion of the North Slope known as the "1002" section of Alaska's Arctic National Wildlife Refuge. It is here that the American government is hoping to find new oilfields to compensate for the decline in Prudhoe Bay production. The impact of such activities on the Porcupine herd cannot be accurately assessed with existing information but predictions ranging from benefit to disaster abound on this controversial issue.

Calving can begin in late May but mostly occurs in the first week of June and is completed by the second week. Thereafter the cows and calves gradually form small bands which join with other bands and meander about the coastal plain or travel into the foothills. By early July almost all of the herd including the bulls and juveniles are in this area and if the flies are bad the caribou will unite into huge post-calving aggregations that sometimes number up to 80,000 animals in one tight formation.

Following the aggregations in July, Porcupine caribou gradually disperse throughout their range north of treeline. This August dispersal has been likened to a caribou vacation when for several weeks there is no particular stress from the climate, the flies, or the food supply.

Pre-rutting behaviour among Porcupine bulls begins around mid-September and thereafter intensifies up to the second and third week of October when mating occurs. Although the rut generally coincides with the fall migration, weather is the dominant factor in initiating southward movements toward the winter ranges. Like their barren-ground relatives to the east, Porcupine caribou do not seem particularly keen to leave their

DISTRIBUTION OF PORCUPINE CARIBOU IN RECENT YEARS



summer range and only start south when substantial snowfalls convince them that winter is truly coming.

Prior to the fall migration, caribou may be broadly distributed across the Yukon and Alaska summer range. Thus the proportion of the herd following each of the three main migration routes (basically the reverse of the spring migration routes) initially depends on where the caribou happen to be when the weather deteriorates. However, this is no guarantee that the caribou will reach the major winter ranges along these routes since a break in the weather may induce them to return northward and later shift to another route, or for some reason they may switch to another route as they continue southward.

New routes further complicate this process. The most impressive of these occurred in 1981 when part of the herd passed through the Ogilvie winter range and continued across the Yukon River where it wintered with some Fortymile caribou east of Fairbanks. In the spring, part of this wintering group, presumably Porcupine caribou, left the Fortymile range taking a new route northward past Fort Yukon and eventually linking up with the traditional Chandalar route to the calving grounds.

As with all large caribou herds, the complexity of seasonal movements is such that each annual cycle is unique in the particular routes and ranges covered by varying proportions of the herd. For the Porcupine herd, the migration corridors and their constituent trails are like a complex road map of expressways and sideroads where turns can be made at any junction, but where certain routes are travelled more frequently than others.

POPULATION STATUS

There is no historical evidence of any major change in the size of the Porcupine herd although several factors such as the whaling industry, the introduction of firearms, and the larger dog teams used by trappers and miners, may have had an impact on the herd.

For several decades prior to 1970, biologists believed that substantial numbers of caribou were occasionally exchanged between adjacent herds. This phenomenon was used to partially explain a dramatic decline of the Fortymile herd which among other things was presumed to have lost part of its population to the Porcupine herd. However, recent radio-collaring studies have shown that, despite seasonal overlaps with four other caribou herds, the only significant interchange of radio-collared animals occurred in the summer of 1987, when four females from Alaska's Central Arctic herd joined the Porcupine herd, and one Porcupine female joined the Central Arctic herd. Whether or not such interchanges represent substantial numbers of animals remains to be determined.

Early estimates of the Porcupine caribou population are unreliable, but since 1972 biologists have been refining a method which now entails photographing the entire herd and counting all the animals directly from 9 in. x 9 in. prints and 35mm slides. A total of six censuses have been completed between 1972 and 1987, but modifications over the years plus extenuating circumstances that plague every census have contributed a certain uniqueness to each estimate. This makes it difficult to accurately compare estimates for a trend, but it is agreed that the Porcupine herd has generally been increasing over the past 15 years. This conclusion is supported by the 1987 census which showed that the herd has been increasing at an average rate of 5% per year from 135,000 in 1983 to 165,000 in 1987.

These figures, which were produced jointly by American and Canadian wildlife agencies, also include calves. In Canada, population figures usually exclude calves since so many are lost in the first year and so few of the remainder are harvested. Thus, for management purposes, the Porcupine herd was designated as 100,000 adults

Porcupine caribou crossing a river in northern Yukon.

after 1983, and as of 1987, is considered to number 135,000 adults.

UTILIZATION

The principal users of Porcupine caribou are now and always have been the native peoples of Alaska, the Yukon, and the NWT. Human occupation of the Porcupine range has been archaeologically dated to at least 20,000 years ago and presumably for most of this period the Porcupine herd was a major component of aboriginal subsistence. Indeed, as recently as the early 1900s, failure of the herd to arrive at critical periods caused starvation among the Inuit and Loucheux who still relied upon it for survival.

Increasing European contact beginning with explorers and whalers followed by fur traders, missionaries, miners, and inevitably the government, altered aboriginal lifestyles and concentrated native populations into their present day communities. Eighteen such communities are directly associated with the Porcupine herd by virtue of their location on or near its range. Eleven of these are in Canada, including Aklavik, Arctic Red River, Fort McPherson, Inuvik, and Tuktoyaktuk in the NWT, and the remainder in the Yukon.

Porcupine caribou are harvested every month of the year by one or more of these communities. The least hunting occurs in July when the herd is on the North Slope and only accessible to hunters from Aklavik (NWT) and Kaktovik (Alaska) who take less than 100 animals at that time. In the fall the herd encounters more hunters as it proceeds southward. Being strategically located on the migration routes and winter ranges of the herd, Arctic Village (Alaska) and Old Crow (Yukon) are most often successful although vagaries of caribou migrations have caused hardships in these communities as well.

The remaining user communities are located on the periphery of the winter ranges and are thus subject to the variations in winter distribution of the herd. Certain communities south of the Yukon River in Alaska have only seen Porcupine caribou once in the last 20 years. In the NWT, the number of caribou wintering in the Richardson Mountains determined the annual harvest until progressive completion of the Dempster Highway gave access to more remote winter ranges in the Yukon. As well, many hunters from other parts of the Yukon come to hunt Porcupine caribou when part of the herd winters near the Dempster Highway. To control such hunting activities, a no-hunting corridor has been established on the Dempster to ensure that

The Porcupine herd is an international herd.

caribou do not perceive the highway as a danger and thus will still cross it to reach winter ranges on the east side.

Harvest information for the Porcupine herd is incomplete and unreliable. Since the majority of hunters have essentially no bag limit and a year-round season, the only possible method of acquiring decent harvest data is through periodic hunter interviews preferably by locally hired field workers. This approach has proved successful in Old Crow and will be introduced into the other Canadian communities in the near future. In Alaska, the hunters of Kaktovik have been interviewed once a year for the past three years, but so far there are no harvest monitoring programs for the other communities.

Existing estimates of the total annual harvest of the Porcupine herd between 1972 and 1986 range from about 2,000 to 7,000 animals, but these are only ball-park figures. Still, at the simplest level, they indicate that between 1978 and 1986, the Canadian harvest has exceeded the Alaskan harvest in 8 out of 9 years, and several times the Canadian component was more than 80% of the recorded total. Also for the same period, the NWT harvest exceeded the Yukon harvest in 5 out of the 9 years. But, regardless of what the true harvests have been over the past 15 years, the bottom line is that they have obviously been sustained by the Porcupine herd since the population has been growing during that period.

The importance of Porcupine caribou to native users cannot be overstated. The pursuit and utilization of this species is an integral part of their cultures, lifestyles, and economies. Native concerns for the future of the Porcupine herd first received public attention during the Mackenzie Valley Pipeline hearings in the early 1970s. At that time, the need for coordinated management of the herd with substantial native input was recognized, but it was not until 10 years later on October 26, 1985, that the Canadian Porcupine Caribou Management Agreement was signed by representatives of native groups from both the Yukon and NWT, plus their respective governments and the Government of Canada. This agreement provided for the formation of an eight-member Porcupine Caribou Management Board with equal representation by government and native groups. Immediately upon the Board's formation in June 1986, it became actively involved in negotiating an international agreement for the conservation of the Porcupine herd between the United States and

Canada. This agreement was signed on July 17, 1987, and provides for the formation of an international board that will address conservation and management concerns requiring international cooperation and coordination.

RESEARCH

Porcupine caribou research owes a lot to the oil and construction industries. Although the Porcupine herd was first recognized as a separate entity in the early 1950s, little work was done on it for the following two decades. However, since 1970, the Porcupine range has been attracting continual industrial attention beginning with a pipeline proposal to link Prudhoe Bay with the Mackenzie Delta; followed by completion of the Dempster Highway in 1979; and recently with proposals to explore for and develop oil fields in the Beaufort Sea and on the "1002" lands in Alaska's Arctic National Wildlife Refuge. Each of these projects has prompted a flurry of scientific investigation and initiated many studies, some of which over the years have evolved from the realm of research to that of monitoring programs that form part of the present day management system.

To manage a caribou herd, it is necessary to know how big it is, where it lives, how it survives, and what threatens it. The first two questions have been answered by many years of intensive aerial surveys which continue to document the population size and range of the Porcupine herd. Along the way, such studies have become increasingly reliant on radio-collared caribou which give quicker and better information. For the past several years, about 100 active radio-collars have been maintained in the herd and are employed in a variety of projects. Also in 1984, Alaskan researchers advanced this method to satellite telemetry so that presently about 15 caribou with special radio-collars are monitored daily via satellite.

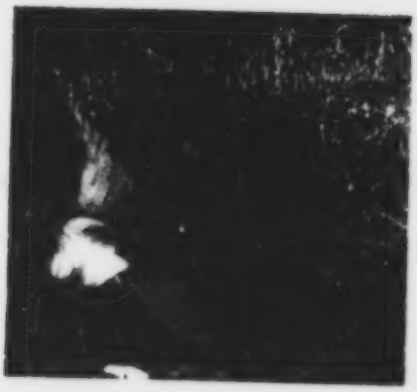
As census and radio-collaring techniques were being refined, management and research branched out to the more complex questions of survival and disturbance. Between 1979 and 1986, a variety of projects have investigated seasonal changes in food habits, activity levels, and habitat selection. On the disturbance side, the impact of the Dempster Highway on Porcupine caribou has been the subject of several studies and continues to be monitored. Another important study, completed in 1988, has made it possible to monitor the physical condition of the herd based on samples taken from hunter kills. This project could provide an early warning of negative impacts from industrial disturbance, or range deterioration due to natural causes.

Until recently, research had mainly focused on particular relationships between the Porcupine herd and its environment. But the Porcupine herd itself is the sum total of all of these relationships. Thus, to really understand how certain changes would affect the herd, they should be plugged into the whole system. This is the purpose of computerized "models." Such models incorporate all the existing knowledge about the herd and then predict the effect of a change in one or more relationships, for example, an increase in harvest levels, or industrial activities on the calving grounds.

The development of computer models in response to management needs recalls the original impetus for Porcupine caribou research. Whereas 20 years ago, even the simplest answers could not be provided for industrial impact assessments, we are presently entering an age when detailed answers will be available for each development proposal. These advancements in both management and research are the result of each elevating the other with increasingly sophisticated requests and solutions. Over the past two decades, this partnership has brought the Porcupine herd from scientific obscurity and primitive management to the forefront of modern research and international conservation.

Other Caribou

Woodland caribou
(Rangifer tarandus caribou)
are larger and darker than other caribou in the Northwest Territories.



WOODLAND CARIBOU

BY PAUL GRAY AND PAUL PANEGYUK

Woodland caribou are a caribou subspecies occurring throughout all of Canada except for New Brunswick, Nova Scotia, and Prince Edward Island. They are usually found in scattered groups in the boreal forest and in mountains. An exception to this rule is the huge George River herd in northern Quebec, which like barren-ground caribou lives part of the year on the tundra and can form large aggregations. In 1984 it numbered 600,000 animals.

While not rare or uncommon in the NWT, woodland caribou are seldom observed. Little scientific study has been devoted to them, and no total population estimate is available. The few studies conducted have been in the Mackenzie Mountains primarily on a herd named after the Moose Horn River.

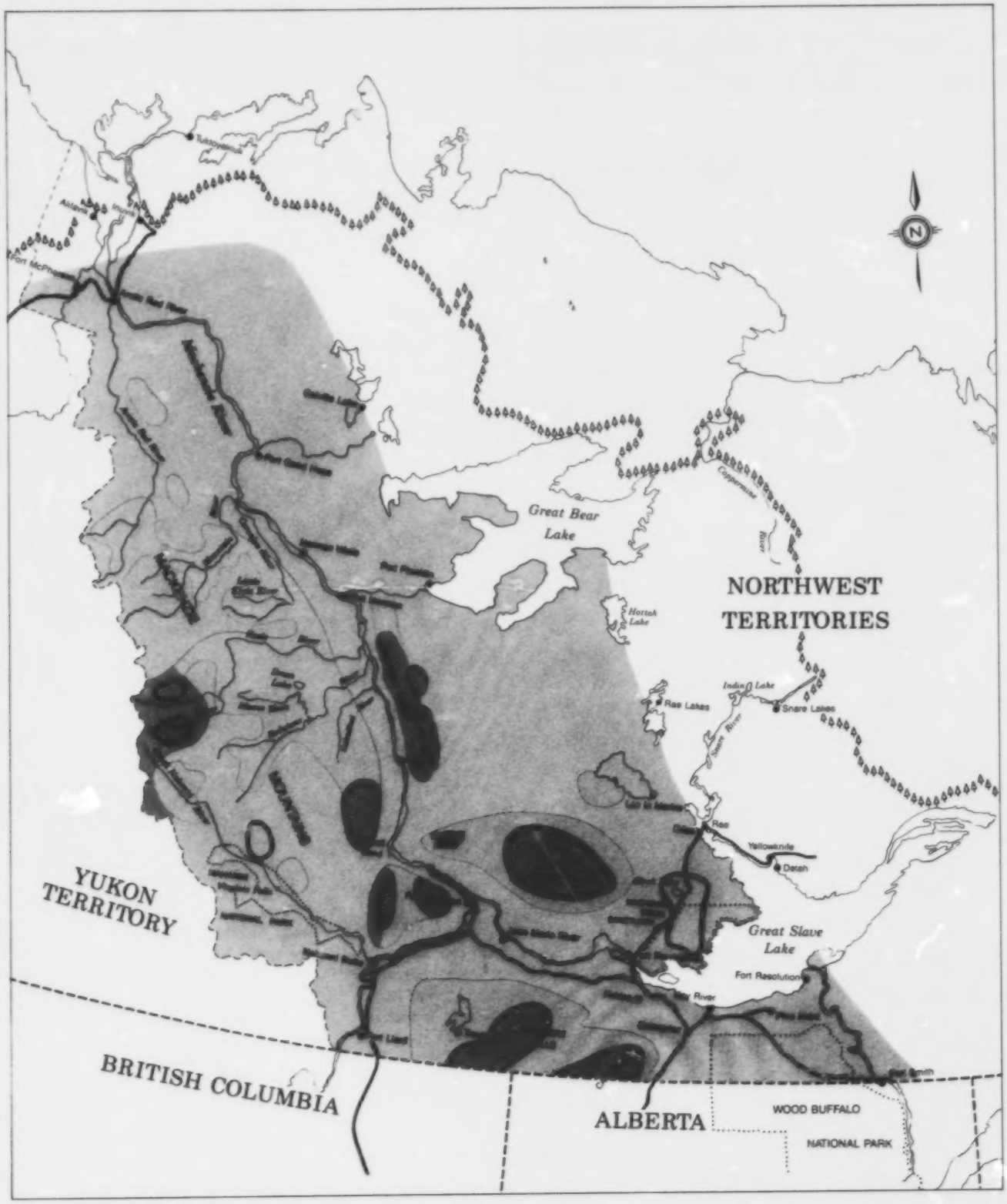
LIFE HISTORY

Woodland caribou are known to grow to sizes of 270 kg or more, with adult males (bulls) being larger than adult females (cows). There is some evidence to suggest that woodland caribou in the NWT are larger than those of the George River herd.

Pregnant cows move to calving grounds by mid-May. Initial studies suggest that in the mountainous regions of the NWT, calving caribou move to plateaus and upland sites. Known calving areas in the mountains are found along the South Nahanni River, and at the headwaters of the Keele and Natla Rivers.

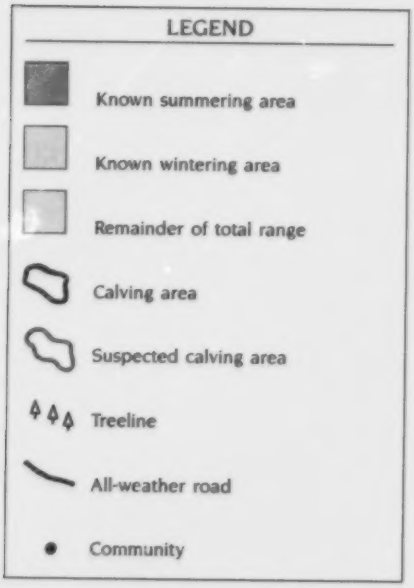
Caribou inhabiting the boreal forest west of Great Slave Lake (e.g. the Mackenzie Bison Sanctuary and the Birch Lake area) are known to calve on small prairies, and it is probable that caribou inhabiting the boreal forest throughout the southwestern NWT use similar areas for calving.

Calves are normally born during mid to late May, which is generally earlier than dates documented for


Great Bear Lake
NORTHWEST TERRITORIES
Horton Lake
Rae Lakes
Snare Lakes
Rae
Yellowknife
Dettah
Great Slave Lake
Fort Resolution
YUKON TERRITORY
BRITISH COLUMBIA
ALBERTA
WOOD BUFFALO
NATIONAL PARK

Typical summer habitat for caribou in the Mackenzie Mountains.

DISTRIBUTION OF WOODLAND CARIBOU IN THE NORTHWEST TERRITORIES



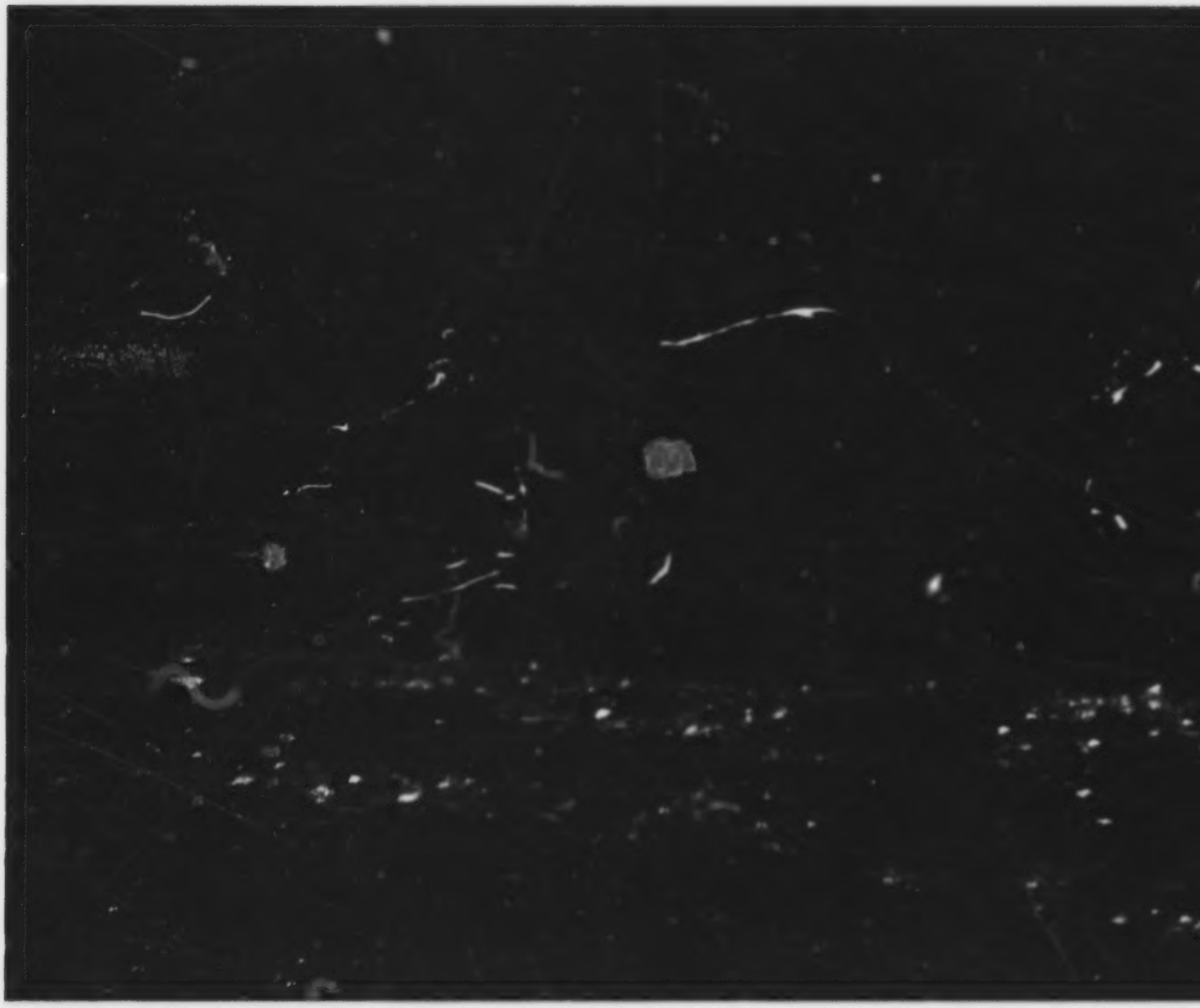
barren-ground caribou. Pregnancy rates of woodland caribou in the NWT have not been extensively documented. For cows older than two years of age in the Moose Horn herd, the pregnancy rate was estimated to be 91%. This is higher than rates documented for caribou in other areas of Canada.

After calving, the cows and newborn calves form nursery bands. In the Moose Horn herd, post-calving bands ranged from 20-200 animals in mid-June. Post-calving areas include moist alpine tundra and open meadows in the mountains. Yearlings and barren cows tend to remain on the periphery of these bands, mixing only during feeding periods. Bulls occupy different areas, usually river valleys at lower elevations. Known important summer ranges for woodland caribou include the McConnell Range, the Redknife Hills, the Horn Plateau, and the Cameron Hills.

Calf survival to three months of age was estimated to be greater than 80% for the Moose Horn herd. This is considerably higher than for other caribou herds in Canada. Many factors can contribute to mortality. Wolf predation is cited by many authors, along with grizzly bears, black bears, and golden eagles as being sources of mortality. In addition, death can occur by accident, disease, and hunting.

In the mountainous regions of the NWT, caribou form rutting companies dominated by a single bull with the peak of the rut occurring in early October. One example of a rutting company consisted of 25 cows, 6 calves, 2 yearlings, 2 immature bulls, and 3 mature bulls. Two of the mature bulls were driven to the periphery of the group by the dominant bull.

Woodland caribou bulls inhabiting the boreal forest have been observed using small prairies (drained lakes) in fall. It is possible that these small open areas are used as rutting grounds. Observations of the Moose Horn herd reveal that the rut occurs in a number of areas, depending on the herd's fall movements to the winter range.



Bulls in late summer are often found in small bachelor groups.

Average band sizes have been reported as nine in October and seven in November. Caribou remain in loose aggregations throughout the winter. Gregariousness is likely, in part, a function of restricted winter range. In February in the boreal forest region of the western NWT, biologists noted that group size varied between one and eleven. In the Mackenzie Mountains in March, bands were noted by two observers conducting different studies to range in size from 1-100 and 7-200 animals. Winter densities in the boreal forest have been estimated at 1 caribou/17 square km in the NWT. This habitat was characterized by shallow lakes, bogs, open fens, and spruce and jackpine forests.

Known wintering areas include the Keele, Little Keele, Mountain, and Carcajou River valleys, the Arctic Red and South Nahanni Rivers, the rolling hills in the Wrigley area, the Camsell Bend area, the Drum Lake area, the Moose Horn, Redstone, and Dahadinni River valleys, and around Virginia Falls. East of the Mackenzie River caribou are known to winter in the Ebbutt and Redknife Hills and on the Horn Plateau.

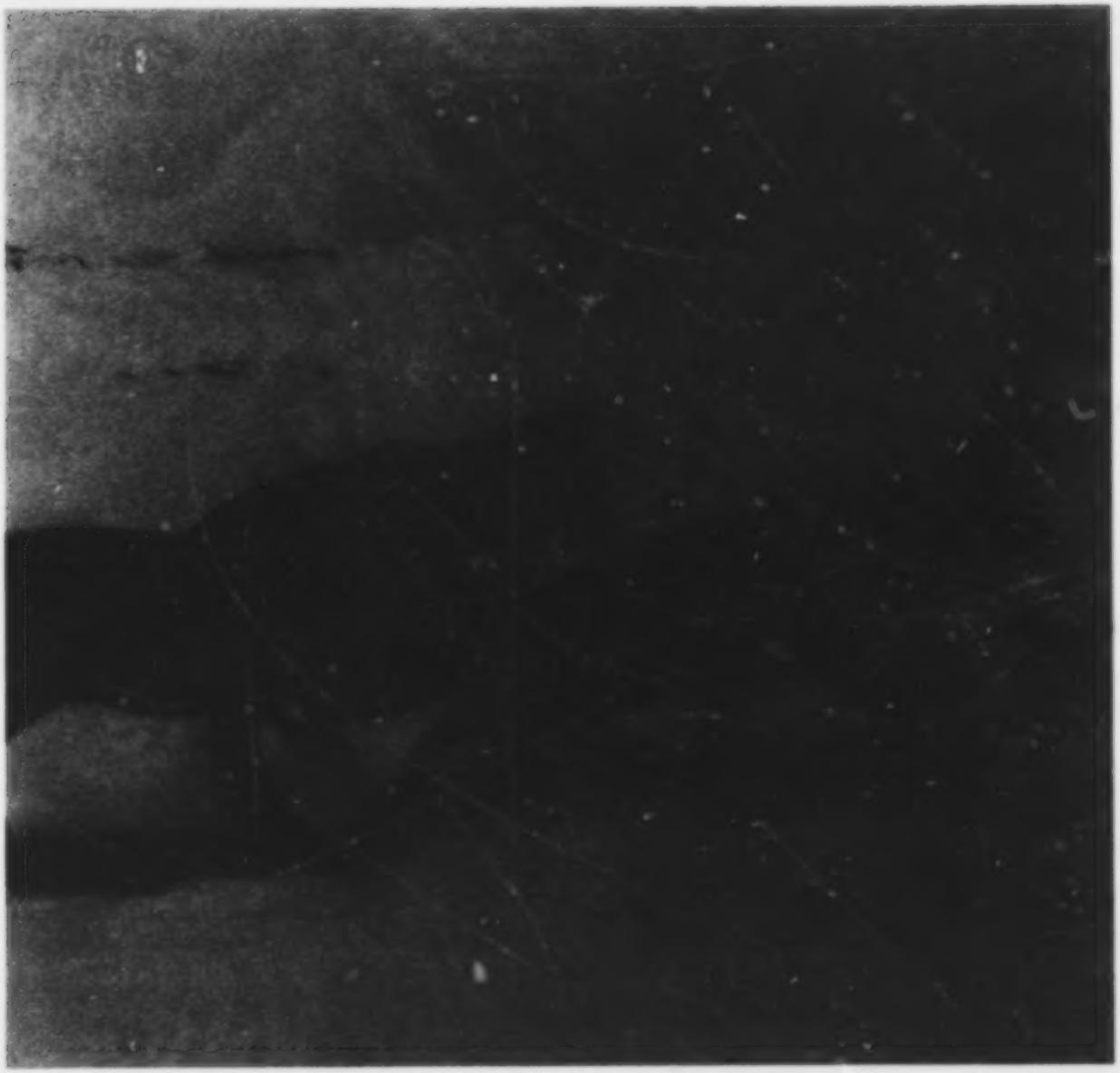
In spring, caribou in the Macken-

zie Mountains move west along the major river drainages until they reach higher elevations. For the Moose Horn herd, the shift from winter to summer range begins in late February or early March.

UTILIZATION

Woodland caribou in the NWT are hunted by native people from most of the communities located within the range of this subspecies. Hunting tends to be opportunistic, with hunters going after animals only when sighted, or when fresh tracks are found. Within the Mackenzie Valley, moose are more actively hunted than woodland caribou. For native hunters, or holders of a General Hunting Licence, there is no closed season or limit on the number of animals which can be harvested.

Resident hunters may harvest one caribou of any age or sex between 15 July and 31 January. Non-residents may take one caribou of any age or sex in the Mackenzie Mountains between 15 July and 31 October by utilizing the services of a licenced outfitter.



Peary caribou
(Rangifer tarandus pearyi)
are a "threatened" subspecies.

PEARY CARIBOU

BY ANNE GUNN

Peary caribou are a subspecies of caribou confined entirely to the Canadian arctic islands. Due mainly to their remoteness, they are the least known of the Canadian caribou subspecies.

They are typically smaller and lighter in colour than barren-ground caribou. In summer they moult their winter pelage to reveal a brown and slate-grey coat with light-coloured legs and grey antler velvet. In winter the hairs bleach and many of the brown tips break off so the coat appears whiter as winter progresses.

Adult bulls weigh between 66 and 92 kg, and cows between 51 and 68 kg. The hooves are relatively broad and the face distinctively shorter than a barren-ground caribou.

Intra-island movements between winter and summer ranges, and between calving and rutting areas, are characteristic of Peary caribou on some, if not all islands. Currently there are data on two inter-island complexes, one involving the western Queen Elizabeth Islands, and the other Somerset and Prince of Wales Islands and Boothia Peninsula. Inter-island movements may have originated due to sporadic winter forage availability. Though the total area of the arctic islands is vast, suitable habitat is not, due to large areas of bare ground, rock, and icefields.

Caribou on Boothia Peninsula, King William Island, and southeast Victoria Island have longer legs and faces than Peary caribou, and their summer coats are darker. These caribou have been designated "southern arctic islands caribou" and are the focus of studies to determine their movements and clarify their taxonomic status. Those on Victoria Island may be a remnant of the Dolphin and Union herd which earlier in the century migrated back and forth to the mainland. (See chapter 10.)

The maximum lifespan of Peary caribou is about 15 years. The

QUEEN
ELIZABETH
ISLANDS
ELLESMERE
ISLAND
Grise Fiord
PRINCE PATRICK ISLAND
Edinburgh Island
MELVILLE ISLAND
DEVON ISLAND
Resolute
BANKS
ISLAND
Sachs Harbour
VICTORIA
ISLAND
Paulatuk
Cambridge Bay
Coppermine
PRINCE
OF
WALES
ISLAND
SOMERSET
ISLAND
BOOTHIA
PENINSULA
Spence Bay
King
William
Island
Gjoa Haven
Pelly Bay
Arctic Bay
Nanisivik
BAFFIN
ISLAND

greatest cause of death is malnutrition which results when ice and snow conditions reduce forage availability. Wolf predation is not important because wolves are scarce.

RANGE USE

The spring migration of Peary caribou to their calving grounds lacks the drama and spectacle associated with barren-ground caribou. Groups number in the hundreds, not tens of thousands; the shallow snow does not concentrate the caribou into dense streams; and the calving grounds lack the high densities characteristic of the great mainland herds.

On Banks Island most of the cows move to the northeast to calve. Most cows on Somerset and Prince of Wales Islands travel to calving grounds in the northeast corner of Prince of Wales Island. On the western Queen Elizabeth Islands, caribou move from Prince Patrick Island across Eglinton Island to calve on eastern Melville Island. On Bathurst Island, spring migration takes the caribou to the north end of the island. On Victoria Island caribou move to calving grounds in the northwest.

In early June a Peary caribou cow still faces two or three testing weeks before the calf will be born. Snow still blankets the land, and as it melts and percolates to the ground, it freezes and bonds the vegetation in a layer of ice. The caribou have to move onto exposed, windswept areas where the snow is shallow and ice does not form. Plant life on these sites is scanty and impoverished — thin fare for the last weeks of pregnancy and the burden of lactation.

Calving generally occurs later than on the mainland, but is influenced by the severity and duration of the preceding winter. In 1978 on Somerset Island after an exceptionally long and severe winter, calving was delayed until the fourth week in June. On Banks Island, however, calving apparently occurs during the first two weeks of June.

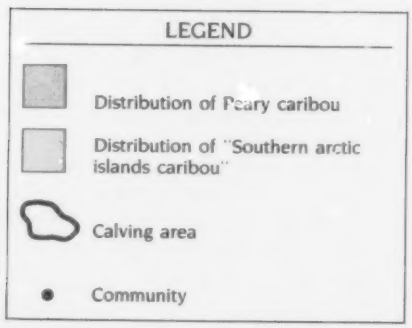
Summer on the arctic islands is a brief intense time when the caribou must rebuild their fat reserves for the long winter. Cows have to support their calves as well as put on weight for their own survival. If they cannot regain sufficient body fat by the breeding season, they do not come into heat and so are spared the demands of pregnancy when they are not in peak condition. Such flexibility in having calves is obviously advantageous in an environment with variable weather.

In July, the caribou are usually scattered in coastal areas but as the thaw advances the caribou follow the sequence of greening vegetation inland, moving onto drier upland sites in late July and early August. They forage in bachelor groups composed of a few prime bulls, yearlings, or subadult bulls; and in groups of up to 20 cows, calves, yearlings, and juveniles. The diet is sedges, grasses, and forbs. The plants are so sparsely distributed as to never form a green carpet on the beach ridges, upland slopes, and plateaus. The flowers of plants such as arctic poppy, purple saxifrage, and mountain avens are avidly consumed for their rich supply of proteins and sugars. By the end of August, these sporadic pockets of forage are converted by caribou into a firm white layer of back fat 6 cm or more thick.

The summer season is too brief and cool for biting flies to interrupt the almost obsessive foraging of the caribou. On the arctic islands, warble flies and blackflies are rare and mosquitoes are not present in great numbers on the few days they are active. Thus the gathering into large groups and the frantic sporadic galloping of mainland caribou tormented by biting and warble flies is absent.

September is a month of storms: the cooling temperatures lock the plants into dormancy and snow starts to conceal the evidence of the brief summer. The fall migration returns the caribou to coastal areas where they rut in October and then move to the more exposed sites of interior plateaus for the winter. Less is known about Peary caribou during fall and

USUAL DISTRIBUTION OF PEARY CARIBOU IN RECENT YEARS



early winter than at any other time.

In winter, groups are smaller than in summer, with singles and pairs frequently seen. These small winter groups forage on upland sites where the snowcover is kept shallow by the wind. They break the windpacked snow with their feet, and nose the chunks and loose snow away from the lichens, dried sedges, grasses, and forbs.

In some years the temperature rises briefly above freezing in October and November. The surface snow melts and freezes into a layer of almost impenetrable ice, or freezing rain can have the same effect. These conditions, especially if followed by a heavy snowfall in the spring, can tax the caribou beyond their reserves. Calves, yearlings, and bulls who used up some of their fat reserves during the rut are the first to succumb, but in severe years many Peary caribou die from starvation.

POPULATION STATUS

Severe winters such as occurred in 1973-74 have decimated Peary caribou populations on the western Queen Elizabeth Islands.

All the Queen Elizabeth Islands were covered by an aerial survey in the summer of 1961. Subsequent surveys in 1972-74 and 1985-87 covered only the western Queen Elizabeth Islands. The population size estimated in 1974 was 10% of the number estimated in 1961. Numbers have continued to decline on Melville and adjacent islands, but on Bathurst and nearby islands they appear to be increasing.

The vulnerability of Peary caribou to periodic die-offs during winter due to snow and ice restricting the availability of forage is less apparent on the larger southern arctic islands. Possibly the slightly longer growing season on Banks, Victoria, Prince of Wales, and Somerset Islands allows richer and more abundant vegetation. Icing in the fall, however, at least in 1952 and 1977, has caused winter starvation and death, and Peary caribou were driven off Banks onto the sea-ice to the mainland by their desperate need for forage.

The realization that the estimated number of Peary caribou on the western Queen Elizabeth Islands had dropped from 25,000 in 1961 to 2,700 in 1974 led to the recognition of Peary caribou as a "threatened" subspecies by the Committee on the Status of Endangered Wildlife in Canada.

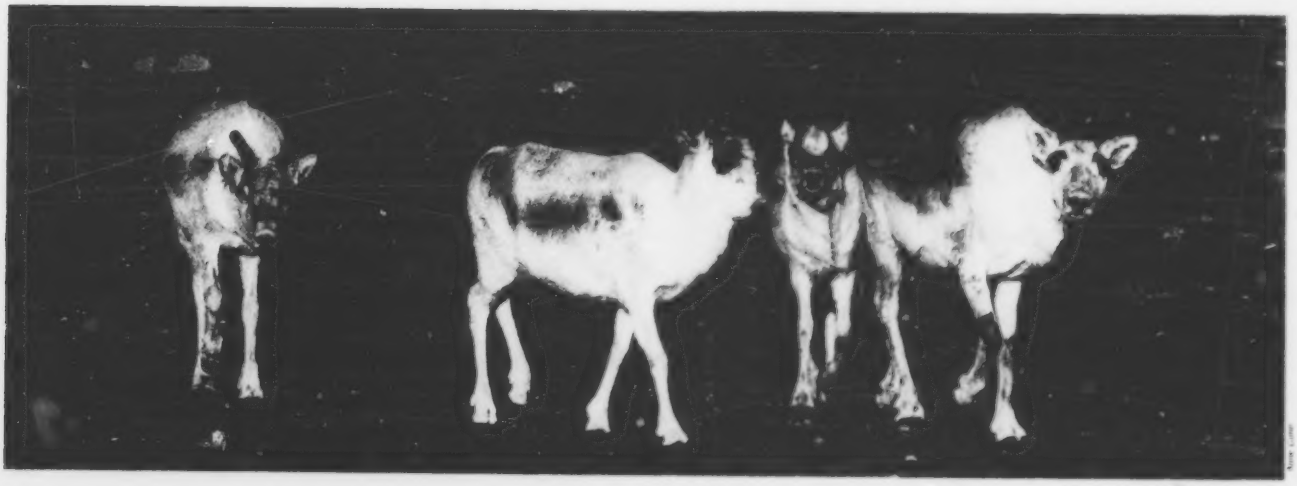
The current estimate of Peary caribou in the Canadian arctic is 20,000 - 23,000, with 5,000 on Banks Island, 4,500 on northwest Victoria Island, 6,000 on Prince of Wales and Somerset Islands, and 2,700 on the western and 1,500 on the eastern Queen Elizabeth Islands. Peary caribou are not found on Baffin Island.

UTILIZATION

Many of the earliest hunters on the arctic islands frequently camped on dry gravel ridges where the bone remains of their meals were scattered by scavengers or weathered away. There are then few clues as to how important Peary caribou were to those early hunters. Perhaps it was only opportunistic hunting, since the sites of the camps in coastal areas and the remains of weapons and bones buried by the sod houses of the Thule suggest marine mammals were the mainstay of those early hunters.

By the time Europeans were exploring the arctic islands, the only inhabited areas were along the southern parts of Banks, Victoria, and Somerset Islands, and the eastern portions of Ellesmere Island. Most Peary caribou populations received little hunting pressure, except when a European exploration party was in the vicinity, as the explorers often relied on fresh meat to stave off debilitation and death from scurvy.

With the establishing of settlements over the last few decades, Peary caribou are now hunted by people from Grise Fiord, Resolute, Holman, and Sachs Harbour. The annual kill is probably about 1,000 -



Peary caribou on Prince of Wales Island.

1,500, mostly in summer and fall when the caribou are fat.

The people of Grise Fiord hunt on Ellesmere Island. All other hunting of Peary caribou occurs on the larger southern islands of the arctic archipelago. The people of Sachs Harbour are heavily dependent on Peary caribou for meat and hides, whereas the people of Holman may choose between true Peary caribou northeast of the settlement or "southern arctic islands caribou." Cambridge Bay hunts mainly on southern Victoria Island, while Gjoa Haven, Spence Bay, and Pelly Bay hunt mainly barren-ground caribou.

There are no seasons or limits on the number of Peary caribou that native people can shoot, but hunters in Resolute and Grise Fiord have decided to restrict their hunting because of declining caribou numbers. Resolute hunters have agreed not to hunt on Bathurst and Cornwallis Islands. Grise Fiord hunters have agreed not to hunt on a large part of southern Ellesmere Island until 1996. Aside from the Belcher Islands (see chapter 21), these are the only places in the NWT where native people have self-imposed hunting restrictions.

Commercial quotas, which allow the sale of meat, exist for three areas. As of mid-1987 they were: Banks Island 95, Victoria Island 125, and Boothia Peninsula 180 (to be shared with barren-ground caribou of the northeastern mainland). For other hunters the regulations are the same as for barren-ground caribou.

Residents may take up to 5 caribou of any age or sex between August 15 and April 30. Non-residents may take one male caribou from designated areas between August 15 and the end of October or November (depending on the area). Non-residents must first obtain the services of a licenced outfitter.

RESEARCH

Few studies have been directed solely at Peary caribou. Most often they are studied in conjunction with muskoxen, the only other ungulate they must share the arctic islands with.

Most work on Peary caribou has been conducted by the Canadian Wildlife Service. During 1974-77 it studied the diet and productivity of Peary caribou in relation to winter weather, and during 1976-77 it studied the behaviour of Peary caribou when exposed to helicopter activity. Numbers and distribution on the western Queen Elizabeth Islands were surveyed during 1985-87.

In 1987 the NWT Department of Renewable Resources collared 10 caribou on Victoria Island. Their movements are being tracked by satellite.

Buster Kailek and son Bobby going to Inuvik by reindeer (Rangifer tarandus tarandus) *in 1960.*

REINDEER

BY JONQUIL GRAVES

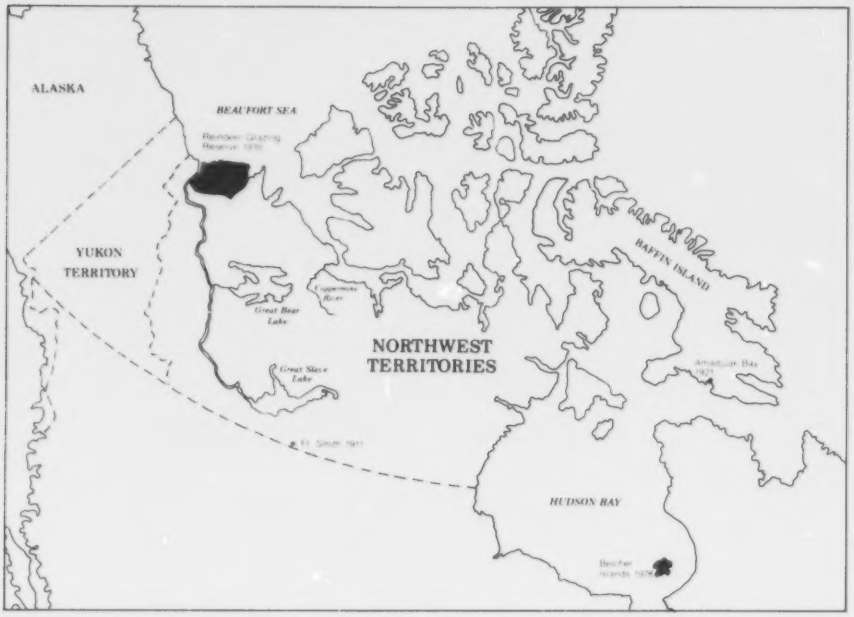
Reindeer and caribou belong to the same species, which is believed to have originated in Alaska or northeastern Asia. The species dispersed throughout the arctic regions of the world and developed minor differences. Animals in northern Europe and Asia became known as reindeer and have been domesticated for centuries. Reindeer were introduced by man to North America during the period 1891-1902 when 1,280 were brought from Siberia to Alaska. Both reindeer herds in the NWT are from this stock.

In the NWT, reindeer and caribou are not easy to tell apart and even experienced people have sometimes mistaken one for the other. Reindeer generally have shorter legs and are wider in the back. They also run differently than caribou. Their colour is a darker, more solid brown, sometimes marked by white spots. Reindeer tend to mill about in a circular motion when rounded up, whereas caribou try to break out or disperse when contained. Reindeer calve in April and May, which is one or two months earlier than caribou, and rut in early September. There is also evidence that fertility in the Mackenzie reindeer herd is higher than elsewhere for the species, and that twinning, which is very rare in caribou, may not be uncommon.

THE FIRST ATTEMPTS

Encouraged by the success of the Alaskan transplant, Dr. Wilfred Grenfell in 1908 brought 300 reindeer from Norway to Newfoundland. By 1913, the herd had increased to 1,500 animals. However, when the Lapp, or Sami, herders hired to look after the animals became discouraged and returned to Norway, the herd fell into disarray.

In the summer of 1911, the federal government purchased 50 reindeer from Dr. Grenfell and ship-



LOCATION OF FOUR ATTEMPTS TO INTRODUCE REINDEER IN THE NORTHWEST TERRITORIES

ped them by rail, wagon, and scow to Fort Smith in the NWT. Thirty-one animals survived the journey, but within six months of their arrival only twelve cows remained. In 1914 the last four were moved to an island in Great Slave Lake. In 1916, the final reindeer was eaten by its herder.

Not long after, a second attempt to bring reindeer to the NWT was made by the Hudson's Bay Co. and the arctic explorer, Vilhjalmur Stefansson. Together they formed the Hudson's Bay Reindeer Co. and obtained a sizeable grazing lease on southern Baffin Island. In 1921 the Hudson's Bay Co. ship, "Nascopie," took on 627 reindeer and six Sami families in Norway, and sailed for Amadjuak Bay on Baffin Island. Sixty-seven reindeer died in passage and the remainder, upon disembarking, ran off in all directions. Only 260 were ever recovered. The project was abandoned in a few years and the herd disappeared.

THE ROYAL COMMISSION

In 1919, motivated by concern for northern natives and a belief that the great caribou herds were declining, a Royal Commission was appointed to inquire into the possibility of muskox and reindeer ranching in the Canadian arctic. As a result of its report, which was released in 1922, the government initiated the first range survey in the NWT. Botanist A.E. Porsild and his brother were hired to study the reindeer herds in Alaska and subsequently conduct a botanical reconnaissance of the country between the Yukon-Alaska border and the Coppermine River in order to find grazing areas suitable for reindeer. The staggering scope of this assignment was equalled only by the staggering results. In two winters and three summers, the Porsilds covered a total of 15,000 miles by dog team, canoe, motor boat, pack dogs, and snowshoes. Notwithstanding the difficulties of their travels they managed to collect 20,000 plant specimens, some zoological specimens, and about 1,000 photographs. When A.E. Porsild accepted this assignment in April 1926, he was already an experienced arctic botanist who could also speak Inuktitut. He was just 25 years old.

Among the areas recommended as being suitable for reindeer grazing were the Mackenzie Delta islands, particularly Richards Island, and the arctic coastal region between the Mackenzie

River and Cape Bathurst. Porsild estimated that this region could support at least 250,000 reindeer and the Great Bear Lake basin could support 300,000.

In 1929, the Canadian Government reached an agreement with the Lomen Reindeer Company of Alaska to deliver 3,000 reindeer from Buckland Bay, Alaska, to the Mackenzie River Delta. The reindeer drive took six winters and five summers to complete. Over terrain which few people had travelled before or since, the herders had to deal with inclement weather, accidents, impassable mountain ranges, wolf predation, personal conflicts, and straying reindeer. But the herders fulfilled their agreement. When they reached the Mackenzie River Delta in 1935 they had 2,382 reindeer, 80-90% of which had been born on the trail. Within a few weeks of arrival 800 calves were born, bringing the total over the 3,000 animals agreed upon.

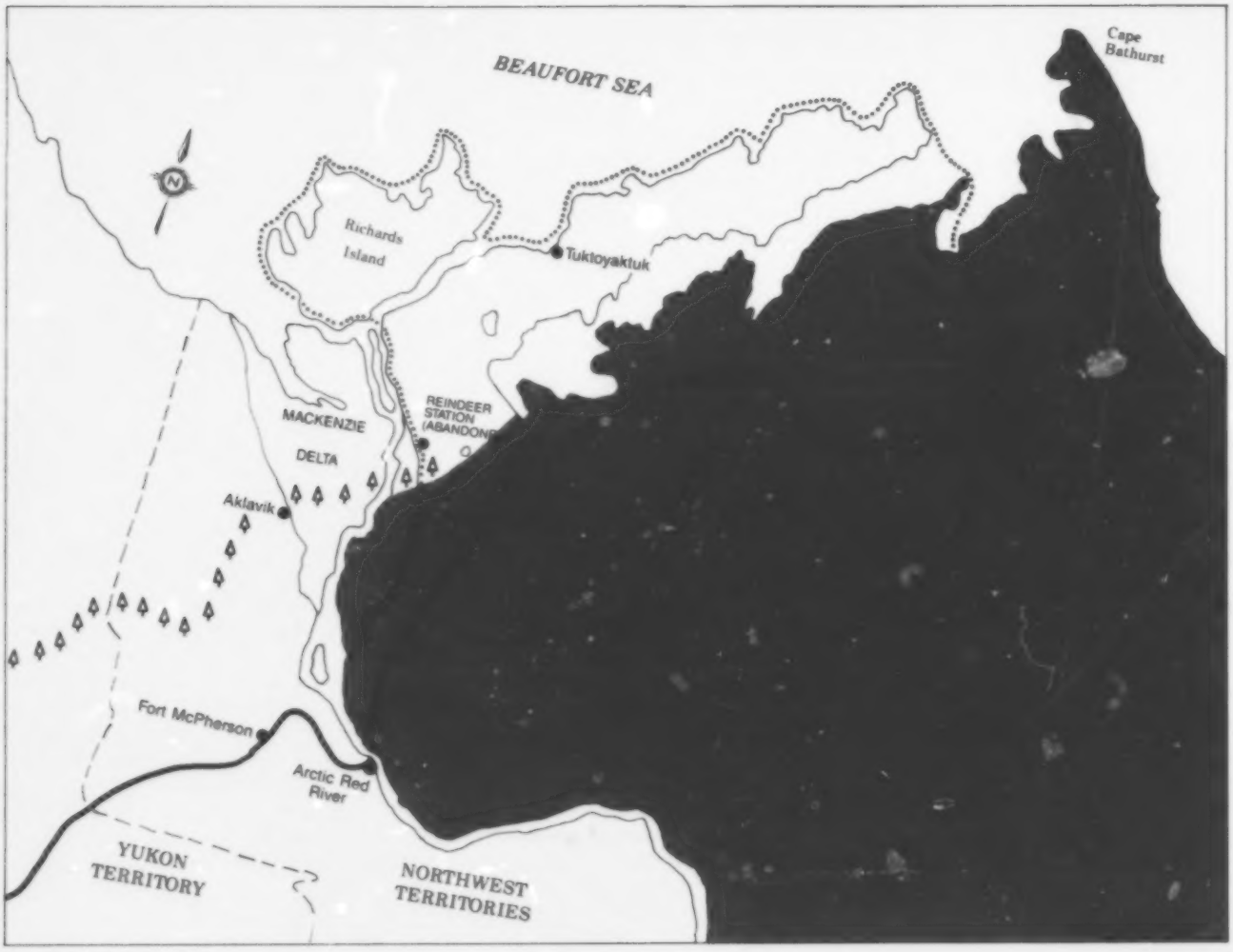
THE MACKENZIE REINDEER HERD

The reindeer were brought to the Delta in a government effort to alleviate food shortages and economic hardships being suffered by the people of the region. After 1906, commercial whaling in the Beaufort Sea was at a standstill, caribou herds in the area had been overhunted, and the people were decimated by a measles epidemic in 1902 and influenza in 1919. Many people had turned to trapping muskrat and white fox. While this produced a cash income, success in a trapping venture was dependent on being able to hunt adequate food for men and dogs. In summer, fish, white whales, and seals provided food, but in winter, life was hard because caribou, the traditional winter food, was scarce. It was thought that bringing in reindeer to replace the caribou and turning some hunters and trappers into herdsmen might be a solution. Herding could provide wages for local inhabitants, and the herd, which would gradually increase, would provide meat and hides to the communities. The original plan was that a main herd, owned by the government, would be set up. From the main herd, smaller herds were to be split off and become the property of Inuit herdsmen, who would eventually repay reindeer into the main herd as their own stock increased.

The project was beset with problems from the start. At first, success seemed assured as the herd steadily increased. But problems arose with herding techniques and the herders themselves. It soon became apparent that the life of a herdsman following the animals was antipathetic to the traditional Inuit life. Instead of the seasonal variety of hunting and trapping, herding was monotonous and often lonely for the men who stayed with the reindeer. The Lapp practice of "close herding," which involved continual surveillance of a herd to prevent straying, proved unworkable due to terrain and weather, and had the tendency to lead to overgrazing. Animals continually strayed away and were lost, while others were killed by predators or suffered from footrot or broken-back disease.

Six native-owned herds were established between 1938 and 1954, while the main herd remained under government control. The first two of those reverted to the government in 1944 when the owners and their families drowned in a storm in the Beaufort Sea. The other herds, after prospering for a few years, eventually declined and were returned to the government. The last one functioned until 1964.

During the same period, the government's emphasis began shifting from social to economic goals. To this end, management of the herd was turned over to private contractors between 1960 and 1968. Various individuals attempted to make the reindeer herds self-supporting and some were successful for a time. The herds appeared to be increasing, slaughters were carried out, and forecasts of growth and economic prospects looked promising. But in 1967 after an aerial count found the



REINDEER GRAZING RESERVE AND SURROUNDING AREAS

herd to be considerably smaller than expected, the future of the entire project began to be questioned. One option was to terminate it.

Weighing against this was the public's awareness of the project, both locally and nationally. It had provided native people with employment (for many their first exposure to wage employment); valuable food at an affordable cost (29,000 reindeer were slaughtered for local consumption between 1935 and 1969); and hides for clothing and sleeping skins. Consequently, it was felt that terminating the project would create political repercussions.

In 1968 the project reverted to the government. The Canadian Wildlife Service was given the task of managing the herd in order to study its biology. At that time the herd was estimated to have about 2,700 animals, and a year later 2,000. Despite difficulties such as staff turnover and the closing of Reindeer Station when most of the employees moved to Inuvik, the herd began to grow again, until in 1971 there were over 5,000 reindeer. Such prosperity was attributed to improved herding methods, good calf crops, favourable

Reindeer are occasionally marked with splotches of white, and their calves are darker than caribou calves.

weather, and no slaughtering.

During this period an independent study was commissioned to examine the socio-economic aspects of the industry. One of its recommendations was that the herd be sold to a local person. In 1973 the involvement of the Canadian Wildlife Service ceased, and the following year the herd was sold to its former chief herder, Silas Kanagegana.

CANADIAN REINDEER LTD.

Mr. Kanagegana and his company, Canadian Reindeer Ltd., managed the herd until 1977 when he retired and sold the company to William Nasogaluak, who continues to operate it under the same name.

When Silas Kanagegana purchased the herd in 1974, it numbered about 5,000 animals. By 1980, the herd had more than doubled, and the scale of operation had increased significantly. With the help of the Department of Agriculture, Canadian Reindeer Ltd. developed slaughtering facilities that would meet national standards. This meant that meat could now be sold outside the NWT. With the opening of the Dempster highway in 1979, shipping costs to the south were considerably reduced. Finally, a Korean market for antlers proved to be an important source of revenue.

Tapping these markets provided an increased level of income, which in

A reindeer roundup.

turn financed the use of modern techniques and equipment. An airplane was purchased for surveillance of the herd, and a bulldozer to maintain an airstrip. Digital analysis of satellite photos in 1981 aided in the selection of feeding areas to prevent overgrazing. Helicopters were leased for the annual round-up in June, at which time the animals were herded into corrals for counting, antler removal, tagging of calves, castration of bulls, and marking of animals for slaughter. Snowmobiles were used in winter to keep the reindeer moving evenly over the ranges, and to assist in the slaughter each February. In 1980 there were 13,000 animals in the herd. In 1982 2,500 were slaughtered. A yearly calf crop of 8,000 was expected, thus enabling the herd to remain stable at 15,000. Eight full-time staff were employed, as well as 40 at round-up time. Nearly $300,000 was returned annually into the business community of Inuvik.

LEGAL COMPLICATIONS

Jurisdiction over reindeer has always been a federal government responsibility. The Reindeer Grazing Reserve was created in 1933 and enlarged nearly three-fold in 1955 by federal orders-in-council. Federal regulations regarding the care and maintenance of the herd were passed in 1933 and again in 1954.

Jurisdiction over caribou is a responsibility of the territorial government. Prior to 1964 caribou were rarely reported within the Reserve, but thereafter they were seen in increasing numbers as the Bluenose herd began reoccupying former range. In 1966 the territorial government issued a Reindeer Reserve Caribou licence, which permitted hunting of caribou within the reserve east of the Kugaluk River. In the 1970s, with caribou continuing to move west, some people claimed the reindeer herd was accomplishing the opposite

of its original purpose: it was no longer a source of inexpensive meat for northerners, and it kept people away from the nearest source of caribou. On the other hand the owner of the herd was understandably concerned about protecting his investment. Opening up the rest of the reserve to hunting would invite poaching. Finally, after much negotiating, an area west of the Kugaluk River was opened up for caribou hunting, from 1 November to 15 December.

In 1984 land claim negotiations between the federal government and the original inhabitants of the area, the Inuvialuit, were ratified. A significant portion of the reserve became private land. The Inuvialuit and Canadian Reindeer Ltd. were unable to reach an agreement on either grazing fees or the sale of the herd.

The herd's future remains in question.

BELCHER ISLANDS

In March 1978, 10 male and 50 female reindeer were purchased from Canadian Reindeer Ltd. by the territorial government and flown to the Belcher Islands in Hudson Bay. The transplant was done to replace native caribou which disappeared from the islands in the 1870s. An aerial survey in 1982 produced an actual count of 222. Although no further surveys have been conducted to date, the population in 1986 was estimated at 600-700 animals. There has been a harvest every year since 1983, beginning with 8 animals and increasing each year until it reached 74 in 1986. Although the harvest is based on recommendations by the NWT Department of Renewable Resources, the final decision on the number of animals harvested is made by the local Hunters and Trappers Association.

Notes on Contributors

Germaine Arnaktauyok
Born in Igloolik, Germaine has become one of the NWT's most well-known artists. Her work has taken her to the USA, Greenland, Sweden, and Israel. She has illustrated three books: Inuit Legends, Stories from Pangnirtung, and Arctic Animals. She now resides in British Columbia.

Chuck Arnold
For the past 15 years Chuck has done archaeological fieldwork in Alaska and the Canadian arctic. Since 1982 he has been the senior archaeologist at the Prince of Wales Northern Heritage Centre in Yellowknife. His recent work has been mainly in the Mackenzie Delta.

Jill Christensen
A freelance nutritionist who has lived in Yellowknife since 1974, Jill devotes her time to counselling individuals, developing educational materials, and giving nutrition workshops.

Bob Decker
Bob has flown aerial wildlife surveys over more than half the NWT as part of the Northern Land Use Information Series mapping program. He's participated in caribou surveys of all four major mainland herds, as well as Melville Peninsula, and Bathurst, Coats, Prince of Wales, and Somerset Islands. He's resided most of his life in the NWT, and currently works as a resource development officer for the Department.

Mike Ferguson
Born and raised in New Brunswick, Mike has been regional biologist for Baffin since 1981. He has studied Peary caribou on Bathurst Island, reindeer on the Belcher Islands, and barren-ground caribou on Baffin Island.

Cormack Gates
Corm worked as regional biologist in the Keewatin from 1979 to 1983. During that period he conducted population surveys of the Kaminuriak herd, and was involved in a cooperative study with the University of Alberta on the nutritional ecology of island populations of barren-ground caribou. Since then, he has worked in Fort Smith, first as regional biologist, then as bison ecologist. In 1985 he visited the USSR, representing the Department in the field of reindeer and caribou management.

Jonquil Graves
Born in England, Jonquil's interest in the outdoors dates back to her childhood in Thunder Bay. She moved to Yellowknife in 1974, and since then has spent summers on the barrens doing everything from cooking to assisting in geophysical surveys. She has worked for Renewable Resources as a conservation education officer, and written many publications for the Department.

Paul Gray
Paul worked for the Department from 1980-87, six of these years as supervisor of habitat management. Paul has studied woodland caribou in Ontario, Alberta, and the NWT.

Anne Gunn
Anne has worked for the Department since 1979. She spent three years as a caribou biologist, working mainly on the Beverly herd, before becoming regional biologist for the Kitikmeot region in 1984. Prior to joining the Department, she worked for the Canadian Wildlife Service studying Peary caribou and muskoxen in the high arctic.

Elisabeth Hadlari
Elisabeth has worked as a photographer for Native Press and the Prince of Wales Northern Heritage Centre in Yellowknife, and for the Department as a conservation education officer. She now resides in Cambridge Bay.

Ed Hall
Ed worked for the Department for 12 years: four as a wildlife officer in Fort Franklin and Iqaluit, and eight as supervisor of conservation education in Yellowknife.

Doug Heard
Doug has worked for the Department since 1976, and has been caribou biologist since 1983. Every year he flies aerial surveys and most recently has been involved in the capture and radio-tracking of caribou. Doug designed the procedure for using aerial photos to count caribou on calving grounds.

Paul Latour
Paul worked for three years in Inuvik as regional biologist, then left to obtain his doctorate at the University of Aberdeen in Scotland. He returned to the Department in 1989 as district biologist in Norman Wells.

Kevin Lloyd
Kevin did his graduate work on coastal grizzly bears at UBC and joined the Department in 1979. He has been the director of wildlife management since 1986.

Jill Oakes
Jill lives in Winnipeg and lectures at the Department of Clothing and Textiles, University of Manitoba. She recently completed her doctoral studies on the making of skin clothing by Inuit. She was curator and coordinator of a travelling exhibit of Inuit clothing which toured the NWT and southern Canada. She has studied under the direction of Inuit seamstresses across most of the Canadian arctic.

Darren Ouellette
Born in Germany, Darrin came to the NWT in 1978. He has worked as art director for Native Press, and exhibited at the First National Assembly of Native Arts in 1982 in Regina, and at the Dene-Metis Art Show in 1984 in Yellowknife.

Paul Panegyuk
Paul was born in Bathurst Inlet. He is a graduate of the Renewable Resources Technology Program at Arctic College in Fort Smith. He has worked for the Department since 1982 as a habitat management technician.

David Ruben Piqtoukun
Painter and carver of soapstone. David has shown his work in numerous solo and group exhibitions throughout Canada. Though he now resides in Toronto, he returns each summer to his birthplace, Paulatuk, to renew his ties with the land.

Cathy Timberg
Cathy has lived in the NWT since 1980 and exhibited paintings in group and individual shows in Yellowknife. Her principal interest is in watercolours and landscapes.

Doug Urquhart
Doug worked as a game management officer in Sachs Harbour during 1970-72, and as a biologist in Yellowknife during 1979-81. His syndicated cartoon strip, "Paws," runs in many northern newspapers, and he has also published several volumes of cartoons. He presently lives in Atlin, BC, and works as executive secretary for the Porcupine Caribou Management Board.

Mark Williams
Mark has worked for the Department since 1979 and been caribou technician since 1981. Assisting the caribou biologist in surveys, his work has allowed him to see most of the mainland NWT from the cramped back seat of a bush plane. He is currently working on a Master's degree in zoology, studying the ecology of wolves in relation to barren-ground caribou.

Glossary of Caribou Names

	Scientific Name (Latin)	French
caribou	Rangifer tarandus	caribou
barren-ground caribou	Rangifer tarandus groenlandicus	Caribou de la toundra
woodland caribou	Rangifer tarandus caribou	Caribou des bois
Peary caribou	Rangifer tarandus pearyi	Caribou de Peary
Grant's caribou (Porcupine herd)	Rangifer tarandus granti	Caribou de Grant (Caribou de la Porcupine)
reindeer	Rangifer tarandus tarandus	Renne
calf		faon
calf, first winter		faon, premier hiver
yearling		jeune d'un an
2-year-old		caribou de deux ans
3-year-old		caribou de trois ans
male		mâle
young bull		jeune mâle
mature bull		mâle adulte
cow		femelle
cow with calf		femelle et faon
cow without calf or dry cow or immature female		femelle immature

	DENE				
	North Slavey	South Slavey	Dogrib	Loucheux	Chipewyan
caribou	ʔekwę́	medzih	ekwǫ̀	vadzaih	ʔetthén
barren-ground caribou	ʔekwę́wá	nódi	hozi gots'ǫ ekwǫ̀	gwichyahnan kak vadzaih	hazu ts'į ʔetthén
woodland caribou	tǫdzı́	medzih	Tǫdzì	ddhah tat guvadzaih	tądzıyé
Peary caribou			Tìchobàh gots'ǫ ekwǫ̀	unknown	ʔetthén gaiʔaze
Grant's caribou (Porcupine herd)			Dehgeènèts'ǫ ekwǫ̀		
reindeer	ʔeedeedeba		ekwǫ̀ k'ehodì		
calf	tsia	tsia	tsìa	egii tsoo	behdziʔaze
calf, first winter		dúh xaye gotsia	tsià	vadzaih tr'ik	behdziʔaze
yearling		yundíh aye gotsia	tsià	egii tsal	behdziʔaze
2-year-old		ǫki meghayé	yagoa	vadzaihgii vaghaiiʔ neekaii	ʔetthén thaze
3-year-old		tai meghayé	yagoa	vadzaihgii vaghaiiʔ tik	deyathʔaze
male	bedzi	įtsé	dets'è	dezhir tsoo	behdzicho
young bull		įtséa	yago	dazoo tsoo	yáguze
mature bull	bedzisho	įtsécho	wedzicho	vadzaih choo	behdzicho
cow	ts'įda	meʔa	ts'ìda	vadzaih tr'ik	ʔetthén ts'úda
cow with calf	eleyake	dezhaaze	ekwǫ̀ ełezhakeh	vadzaih ch'iyaht'ok	ʔełyáske
cow without calf or dry cow or immature female	erezha	meʔa aetsíle	ts'ìda	vitshiʔ tr'ohchii	dáuhé ʔelchániie

	INUKTITUT			
	syllabics	Roman orthography	Inuinnaqtun	Inuvialuktun
caribou	ᑐᖏᑐ	tuktu	tuktu	tuktu
barren-ground caribou				tuktuvialuk
woodland caribou				tuktuvialuk
Peary caribou				tuktuaraaluk
Grant's caribou (Porcupine herd)	ᖃᓄᐊᕐᒥᒃ			
reindeer	ᖃᓄᐊᕐᒥᒃ	qunngiq		
calf	ᓄᖅᖃᒃ	nurraq	nuranguaq	nuqaq
calf, first winter	ᓄᖅᖃᐱᓂᒃ	nurraviniq	nurraq	ukiaksaliaq
yearling	ᑎᖏᑐᖃᒃ ᑎᒧᑐᖃᒃ	tiqituraq tirituraq		nauraviniq
2-year-old	ᓄᑲᑐᓚᒃ	nukatugaq		innaliaq
3-year-old	ᐊᕐᔪᓴᓪᓗᒃ (male)	angusalluq		innaliaq
male			angulaluq	angusaluq
young bull	ᐅᓯᐊᓕᓴᐃᔪᐊᒃ	usualigjuaq	anguhaluaq pangniq	pangniq
mature bull	ᐸᖏᓂᒃ	pangniq	pangnivik	pangniraluk
cow	ᐊᖅᓇᓪᓗᒃ	arnalluq	angnaluq	kulavak
cow with calf	ᓄᖅᖃᓕᖏ	nurralik	kulavak	nuqariik
cow without calf or dry cow or immature female	ᓄᖅᖃᐃᑦᑐᒃ	nurraittuq	nurraituq	irnisuittauluk

Further Reading

File Reports and Progress Reports published by the Department of Renewable Resources are available to the public without charge. Many of the other publications (from Chapter 6 onwards) are available through inter-library loans from the Department of Renewable Resources Library, Box 1320, Yellowknife, NWT, X1A 2L9.

The Department has undergone a number of name changes over the years, and has been previously known as the NWT Wildlife Service, the NWT Fish and Wildlife Service, and the NWT Game Management Service. All of these names appear in the following list, and refer to the same organization in various stages of its growth.

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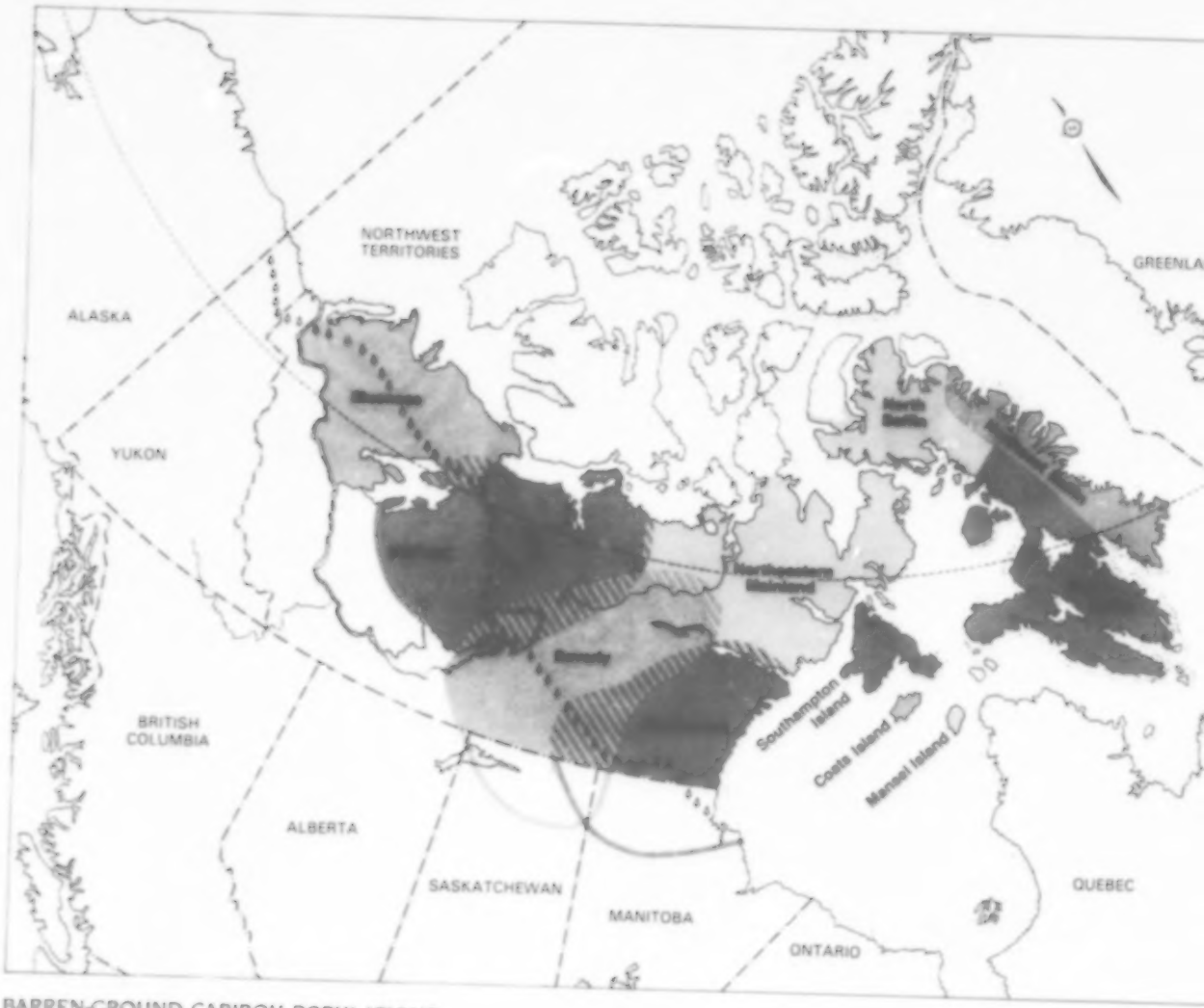
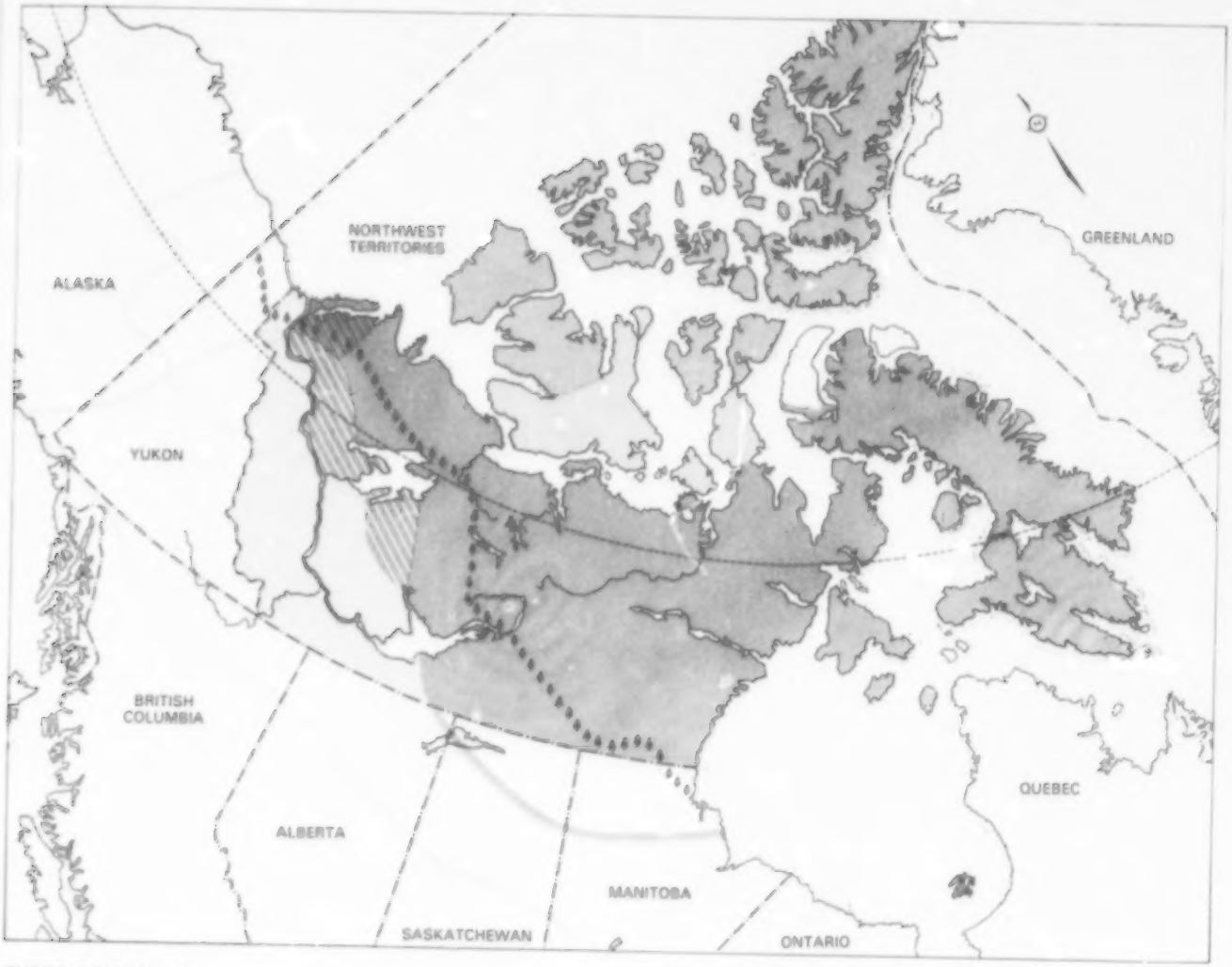


BARREN-GROUND CARIBOU POPULATIONS
IN THE NORTHWEST TERRITORIES



TYPES OF CARIBOU
IN THE NORTHWEST TERRITORIES